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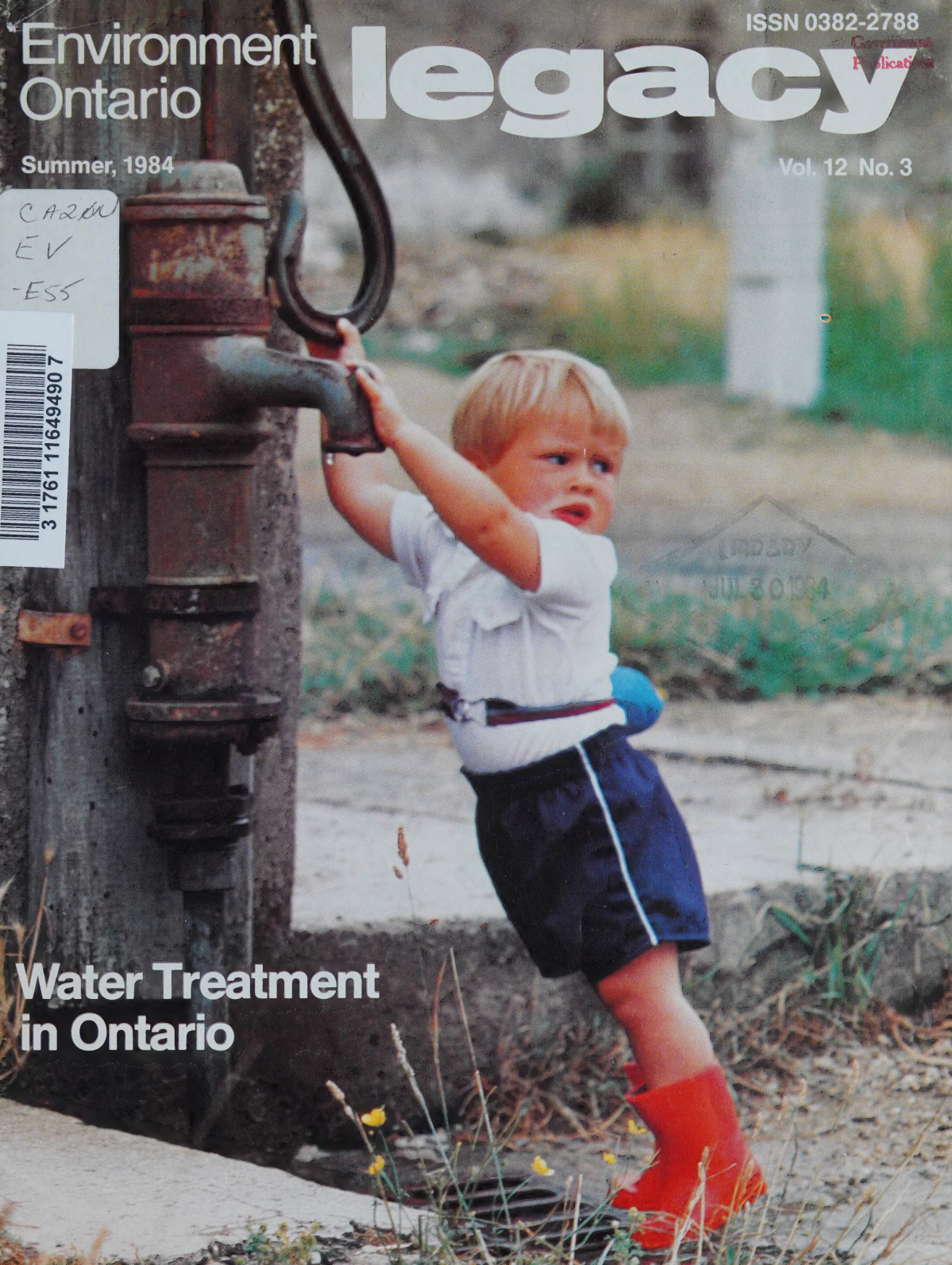
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Water Treatment
in Ontario





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Ministry
of the
Environment

Ontario

Hon. Andrew S. Brandt,
Minister

Brock A. Smith,
Deputy Minister

Environment Ontario **legacy**

Summer 1984

Vol. 12, No. 3

Published quarterly by the Ministry of the Environment, Communications Branch, 135 St. Clair Avenue West, Toronto, Ontario, M4V 1P5, for those interested in the many facets of environment enhancement. Reproduction of articles authorized without further permission. Second Class Mail Registration Number 4168.

EditorRobert Koci
Director of Communications Branch.....R.J. Frewin



On an outing into the country, Ian, a nephew of staff photographer Tessa Buchan, is caught in the act of discovering a strange instrument that once was, for several generations, one of the most important tools for the supply of water in Ontario.

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Acid rain

Canada will go it alone

In March, the federal government and Canada's eastern provinces decided to deal with the acid rain problem alone with a 50 per cent cut in sulphur dioxide emissions by 1994. This decision was made partly in response to U.S. President Reagan's statement in January that he would only finance more research, not pollution controls, and also to impress the U.S. administration with Canada's sincerity of purpose. By moving ahead with this domestic abatement action, the Canadian ministers hope to buy more time for Canada's environment.

reduction by 2 million tonnes

Following the Canadian initiative, Ontario Environment Minister Andy Brandt said: "We cannot reach our objective without the co-operation of the Americans. For the moment we are going it alone, but we need them badly."

In the following week, Mr. Brandt took Canada's new commitment on acid rain to Washington.

"I will discuss the decision taken by the provinces and the federal government to go it alone to fight against acid rain," he said. "We intend to reduce unilaterally Canadian emissions of SO₂ by more than two million tonnes per year by 1994, regardless of any decision by the U.S."

"But I will also emphasize in Washington that the bottom line of the solution to the acid rain problem af-

fecting eastern North America demands a major reduction of SO₂ emissions at sources in the United States."

Mr. Brandt was encouraged by the results of a Harris poll conducted in

the U.S. Of the people questioned, 90 per cent felt that acid rain is a serious U.S. problem and 70 per cent would pay up to \$100 in higher taxes for pollution control.

Ten countries join

Later in March, the Canadian environment minister and environment ministers from nine European countries met in Ottawa and pledged to reduce acid rain emission in their countries by 30 per cent by 1993. The Canadian government and the provinces, West Germany, France, Switzerland, The Netherlands, Denmark, Norway, Sweden and Finland also promised in their five-point declaration to cut the emission of nitrogen oxides in their countries.

U.S. did not participate

At the meeting, Environment Minister Charles Caccia said he hopes the ten-nation agreement will encourage the U.S. Government to change its attitude and that it also will bring pressure on the neighbors of nine European signatories, including Britain, Belgium, Spain and the eastern bloc nations, to cut their emissions.

The U.S. did not participate in the Ottawa conference, but sent an observer. However, the U.S. is expected to attend conferences on acid rain scheduled for Munich in June and

Geneva in September. More than 30 nations, including the East European countries, have been invited to these meetings.

NE States sue

While the ten-nation conference proceeded in Ottawa, six Northeastern states of the U.S. filed suit against their federal government for failure to curb acid rain. The states concerned are New York, Connecticut, Maine, Vermont, Rhode Island and Massachusetts.

In the suit, filed in the Federal District Court in Washington, the Environmental Protection Agency is charged with having ignored a section of the Clean Air Act. Under this section, states in the Middle West could be forced to reduce their SO₂ emissions.

The suit names EPA administrator William Ruckelshaus as the defendant. It charges that inaction by the agency on acid rain resulted in contaminated drinking water supplies, irreversible environmental damage and a continuing danger to public health.

Canadian side of Detroit River shows water quality improvements

The assessment of the water quality on the Detroit and St. Clair Rivers and on Lake St. Clair will be co-ordinated by a Detroit/St. Clair Rivers Improvement Team established in May by Environment Minister Andrew S. Brandt. The team, which will have its headquarters in Sarnia, will also recommend future monitoring and control measures.

A similar team has been working on the Niagara River for two years, co-ordinating monitoring and pollution control measures including scientific reports which have provided significant evidence in U.S. industrial waste site hearings.

The team will also represent Ontario's interest in the St. Marys River between Lake Superior and Lake Huron. It will also make recommendations outlining Ontario's role in assessing the adequacy of discharge permits and cleanup proposals for waste sites, both in Ontario and in Michigan.

Headed by co-ordinator John Moore, the team will report to the Associate Deputy Minister for Intergovernmental Relations and Strategic Projects and will work in co-ordination with the U.S. Environmental Protection Agency and the Canadian federal government. Mr. Moore was, up to his appointment, manager, abatement east, in the ministry's Sudbury regional office.

The ministry's Great Lakes Surveillance Program in the Lake St. Clair, St. Clair and Detroit River region will be assisted by the Guardian One, the ministry's sophisticated floating laboratory, and by the Ninety-Nines, an international organization of women pilots who will fly surveillance patrols for the ministry.

A recent Environment Ontario biological survey of the Detroit River showed satisfactory and improved water quality conditions particularly along the Canadian side. Environment Ontario has sent the report to the International Joint Commission and referred it to United States and Canadian government authorities under the Great Lakes Water Quality Agreement.

"I am happy with the improvement of the river over the past dozen years," said Environment Minister Andy Brandt. "Our Great Lakes surveillance teams will continue to monitor the river to assess the effectiveness of completed and ongoing control measures. I also ask our Michigan neighbours to continue with their efforts for pollution control in

dian shoreline exhibited a balanced community structure indicative of better water quality conditions.

Localized areas of impairment by heavy metals and PCBs were found along the Canadian shoreline in the vicinity of the Little River, Turkey Creek, Riviere aux Canards, the West Windsor sewage treatment plant and storm sewers along the Windsor waterfront area. Since the 1980 survey, the West Windsor sewage treatment plant has been expanded and the Little River plant is about to be expanded. A \$20 million sewage collection system program is also under construction for Sandwich West Township in the Windsor area.

Sediments along the U.S. shoreline contained concentrations of contaminants above the guidelines for

continued efforts for control

this very important waterway of the Great Lakes."

The report "An Assessment of the Bottom Fauna and Sediments of the Detroit River" uses bottom sediment and bottom-dwelling organisms as indicators of pollution levels on the American and Canadian sides of the river.

The mayfly, an organism indicative of good water quality, was found at 70 per cent of the water quality stations in 1980 compared to only 26 per cent in 1968. The occurrence of mayflies along the American shoreline, although improved from 1968, was still less than that found on the Canadian shoreline. Large numbers of pollution-tolerant aquatic worms indicating persistent and severe organic enrichment were evident on the American shoreline. The entire Cana-

open-water disposal of dredged material, most notably PCBs. Fighting Island indicated levels well within Environment Ontario dredging guidelines.

Reduced mercury levels in the Detroit River sediments observed during the period 1970-1980 are attributed to controls placed on mercury losses (e.g. BASF Wyandotte Corp. Michigan and Dow Chemical Corp. Ontario). Increases in other heavy metals such as chromium, copper, lead and zinc in the vicinity of the mouth of the Rouge River along U.S. shoreline indicate recent industrial or municipal inputs.

Copies of the report are available from the Ministry of the Environment, Water Resources Branch, 1 St. Clair Avenue West, 4th Floor, Toronto, Ontario M4V 1K6. ◇

Environment research gets \$7 million

Environment Ontario will provide \$7 million in grants for environmental and health-related research program contracts to be awarded to universities and private research organizations in the fiscal years 1984/85 and 1985/86.

Of the \$3.3 million allocated for 1984/85, \$1.2 is already committed to ongoing research projects initiated during the past two years. The remaining \$2.1 million will be used to initiate new research projects.

Some of the ongoing projects are:

- Research on the contamination of recreational waters by viruses or bacteria and the possible effect on human health. The University of Toronto is in the second year of this research.
- Development of a mathematical model to predict the effects of spills of hazardous substances in soil, under way at the University of Waterloo.
- Ontario Research Foundation

examination into ways of improving sampling and analytical methods for leachates and contaminated groundwater.

A request for project proposals to support the ministry's list of research priorities will go to universities and private research organizations. All participants must present the results of their work at either the Annual Technology Conference or at one of the specialty seminars.

Ministry supports ten recycling projects

Ten recycling operations in 15 Ontario municipalities involving one million people have received grants totaling \$890,000 under Environment Ontario's support program for source separation waste recycling projects.

"The ministry's support has contributed substantially to the start-up and to the continuation of these operations despite a slump in the demand for recycled material," Environment Minister Andy Brandt said in announcing the grants.

The following projects have received financial support:

Total Recycling Systems Ltd. in Kitchener — The Environment Ontario grant of \$110,000 helped the company to expand its pilot project to a city-wide source separation system serving a population of 140,000. The company provides special plastic containers for the storage of glass, paper and metals to homes and collects them weekly in single-man, side-loading trucks.

Halton's Recycled Resources Inc. — \$321,000 in grants enabled the organization to expand its operations to all municipalities in the Regional Municipality of Halton. A full recycling service including newsprint, glass, metal, fine papers and cardboard is provided.

Niagara Recycling — a non-profit

operation provides work for the handicapped. It has received \$142,195 and provides curbside collection or commercial pick-up in St. Catharines, Niagara Falls, Welland, Port Colborne and Thorold.

Richmond Hill Recycling Corp. — a volunteer, non-profit operation has been granted \$37,000 to expand its area of operation to communities beyond Richmond Hill.

J.C. Waste Management — collects fine papers in Ontario government offices in Toronto and has expanded its collection to municipal and private offices in the Toronto area. It has received grants totalling \$85,000 to assist in its expansion program.

Durham Recycling Centre — collects newsprint and office paper in Oshawa and provides a recycling depot for glass and cans. It was granted \$61,600.

East York Conservation Centre — suspended collection because of a decline in the market. A grant of \$77,500 has allowed it to resume and expand activities.

Stratford Recycling — collects newspapers and cardboard in Stratford, Perth and Huron Counties. Grants of \$44,000 have aided the company in the collection and preparation of materials.

M.O.R. Resources — operated an

office paper recovery program in Kanata with the help of a \$10,000 grant. The project has reached self-sufficiency after one year of operation.

City of Kanata — is expanding a glass recycling program with the assistance of a \$9,500 grant for promotion.

Grants are available to municipalities, private waste management businesses, community groups and volunteer organizations to encourage and aid the development of multi-material source separation projects. A demonstration that the project can be self-supporting within three years and that it has the capability to carry out the work is required.

US polluters exceed limits

In a random sample of 531 major dischargers of pollutants in the U.S., 31 per cent exceeded the limits for one or more pollutants for at least four consecutive months, reports the U.S. Environmental Protection Agency. No fewer than 82 per cent of the sampled dischargers exceeded their permit limit at least once within 18 months.

OWMC reduces search to eight sites

The Ontario Waste Management Corporation announced in March that it has narrowed down its search for an optimum location for the establishment of a facility for the treatment and disposal of special industrial wastes to eight sites in the Golden Horseshoe area.

One of the eight sites is located in Mississauga, three are in Milton, two just south of Niagara Falls and two are in West Lincoln near Grimsby. The president of the OWMC, Dr. Donald Chant, said that regardless of which site is ultimately chosen, residents will put up a stiff fight against it. This will not, however, deter the corporation from finding a safe site as soon as possible.

Three major elements involved

The proposed waste treatment facility will involve three major elements: a special high-temperature incinerator, a chemical treatment plant to neutralize or solidify wastes and the landfill for the disposal of safe residues.

The OWMC was created in 1980 with the mandate to find safe and efficient methods and sites for the disposal of hazardous liquid industrial wastes. In two previous stages, the corporation narrowed down the hunt for such a treatment and disposal site to the Golden Horseshoe area, where 70 per cent of Ontario's wastes are produced.

Later this year, the OWMC will announce one of the eight sites as its preferred site. After further detailed tests of this area, the final announcement of a treatment and disposal site can be expected in 1985.



Legend

- Candidate Site
- Regional Municipal & County Boundaries
- Township, Town & City Boundaries
- LF Landfill
- PI Physical/Chemical Treatment Plant & Incineration

Source: Ontario Waste Management Corporation, March, 1984.
Note: Symbols indicate location only, and not size or shape of sites.

Site Name	Landfill	Physical/Chemical	Incinerator	
LF-2N	*	*		
LF-4N	*	*		
PI-1N	*	*	*	
PI-13N	*	*	*	
LF-9C	*	*	*	Integrated
LF-3C	*	*	*	Integrated
LF-1E	*	*	*	Integrated
PI-27E	*	*	*	

Penetration of spills studied

The penetration of hazardous liquid spills into soil and groundwater is the focus of a research grant of \$132,750 awarded by Environment Minister Andy Brandt.

The study will develop a computer model that can be used to predict the extent, the spreading and the penetra-

tion of dangerous liquids in soil. The model will be developed from laboratory test data and evaluated by comparing them with data collected from actual spills.

The funds for this three-year study are provided by the Provincial Lottery.

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Second prize:

Good water

Opposition and criticism are part of the life of a politician.

When you seek public office, a thick skin certainly helps. If you cannot take criticism when you become an elected official, you certainly develop one in a short time.

All of this as a prelude to the move made by Wilmot Township Council last week to proceed with a plan to improve the water system in New Dundee. Members of council were almost unanimous in the decision to go ahead as soon as possible.

Wilmot council has been chided in these pages before for sitting on the fence, for not taking action until it was almost too late.

This time, the decisions are being made in spite of the opposition, the flak that comes with being a politician.

The fact that all the people living in New Dundee should have good water to drink is the over-riding feature here. Because some residents will have to pay more to help others get good water is what council considered.

And that's a good policy, no matter who is offended.

Wilmot Township Council showed intestinal fortitude in this decision. Congratulations, gentlemen.

Don't back down

Pardon us for writing about the New Dundee water system again but the issue is being so hotly debated that we need to repeat our stand.

Something must be done in New Dundee, no matter what a determined group of citizens may do to prevent it.

Water from a number of taps is a dirty brown color. The threat of typhoid fever hangs over a portion of the community. Wells are contaminated by sewage.

Is this not enough to spur right-minded people into action?

Township council has taken a definite step to seek more funds and members did not back down in their determination to get something done.

They are to be commended for their stand.

Coun. Lou Hill said the water situation was a disgrace in a civilized nation. And he's right.

roads were worked on and reshaped with the 'contaminated' soil taken out (ie: shoulders dug up) and transported to the disposal site.

In all, 5,000 cubic metres of soil from this contract and 1,200 cubic metres taken from the Foran and Rodden Creek locations will have been mixed by the time the work has ended.

All the material was stockpiled and then mixed in with the cementitious material and placed in the

disposal site directly behind the two mixing plants. It was spread and compacted leaving a solid mass which permits little to no moisture.

The quality control is high for the project as there is at least one supervisor keeping an eye on the work at all times. Checks are made to ensure there is a right amount of mix, on moisture and compaction and other facets of the operation. Mr. Allain said the work that has been

done has been of a high standard and he doesn't anticipate complications when it is completed.

He added that the Ministry of the Environment has taken "the most logical approach" in combatting the PCB problem.

The clean-up project was awarded by tender to Ambler-Courtney Ltd. of Toronto and a sub-contract for the mixing was awarded to Phillip Enterprises of Hamilton.

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THE GREAT DUNDEE WATER DEBATE

Survey shows 60% in favor...

by Laura Murray
Independent Staff

NEW DUNDEE — Sixty per cent of residents here show some support for the new water system Wilmot council has okayed for the village, a mini-survey carried out by The Independent last Wednesday indicated.

The survey asked passers-by what they thought of the one million dollar project. However, the 60 per cent who didn't oppose the project didn't give it an outright approval, either.

"I think it's needed for the central core ... but the new districts have regulation-sized lots ... and I don't think they need it," Robert Fiederlein commented.

Another resident, who lives in the newer subdivision of New Dundee, said, "I think it's alright, we probably need the water."

"But my water was tested and came out okay," Carl Buck said.

Two years ago, a study showed almost half the homes in the village had polluted water in their wells, caused by leaky septic wastes. Council then decided, last December, to proceed with the water plan and apply for provincial grants.

Although funding has come through, residents may have to pay as much as \$2,000 each for the project.

But, Wilmot councillor Wayne Roth said New Dundee residents should look at the benefits of the system and "the value the project will add to their property."

Some residents, however, can't see his logic.

"It's too expensive for just water. Why rip it up in five years and have another expense (for a sewage system). I don't need it, and the grant was only set up for those who need it, but now they've included the whole town," Lynn Perrin, a Main Street resident said.

Another resident took a different angle when she said the system was needed, particularly for potential growth.

"It's good for the community and growth, since there needs to be adequate water for growth. We have to do what's best for everyone," Rita Toman said.

The result of The Independent survey closely resembles that of James Capplemann, a New Dundee resident. Capplemann carried out a more involved survey some time ago, which indicated 33 per cent approval to the project.

...But Brown petition differs

by Jim Newton

Independent correspondent

NEW DUNDEE — Wilmot Township council may have given the green light to Dundee's water system last Monday, but that hasn't stopped Beatrice Brown and daughter Bev from circulating a petition asking residents if they favor the project.

As one resident put it, "I'm sick and tired of this whole water thing, and I wish they'd put it to rest one way or another, but don't mention my name. I don't want to make enemies."

While inking his name on the 'No' side of the Are-You-In-Favor petition, the same resident fingered through the sheets, noticing to his "disney" that the vast majority of the signatures had voted with him, and only a few 'Yes'.

While the Browns won't release partial petition results, preferring to wait until the survey's complete, it's clear at this point that

the winds of war are starting to blow. The final decision rests with the Ontario Municipal Board.

Councillor Willie Coker's not surprised by the Brown petition but said he would be surprised if the majority of residents swung away from favoring the water system.

Referring to the earlier Capplemann petition showing a slim majority in favor of the system, Coker said the Browns' petition will not change council's decision to proceed.

Contacted by phone, and informed that the Browns' petition to date shows more saying no than yes, Capplemann commented that "they're (the Browns) probably using my list of survey results and starting with those who voted no when I went around."

Capplemann said he doesn't think the petition will affect the O.M.B. decision and that the water system will go ahead with the board's blessing.

(The awards were given to both publications for series of editorials and reports on environmental subjects. Space limitations allow us to reprint only a few samples of the series.)

Names in the news

(photos: Tessa Buchan)



Rajula Atherton

Rajula Atherton

Rajula Atherton has been appointed director, accounts branch of the Ontario Ministry of the Environment.

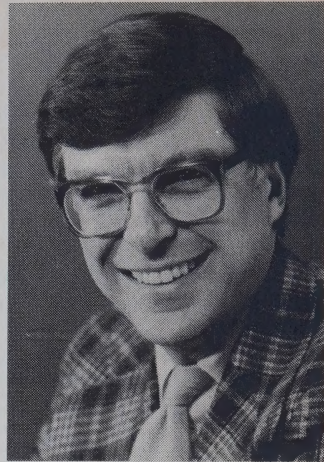
Born in Lahore, Pakistan, Mrs. Atherton studied mathematics at the Punjab University in Lahore. After her arrival in Toronto in 1966, she articulated with the accounting firm of Peat Marwick and Partners and graduated as a C.A. in 1971.

Mrs. Atherton joined the Ontario Civil Service in 1972 as senior examiner of loan and trust companies with the Ministry of Consumer and Commercial Relations.

In 1973 she joined the Ontario Addiction Research Foundation as manager of financial services. From 1976 to 1980 she was a controller in the finance branch of the Ministry of Housing.

In 1980 Mrs. Atherton transferred to the Ministry of Citizenship and Culture to develop and implement comprehensive auditing for the ministry. She was appointed director of the internal audit branch the following year.

Mrs. Atherton is married, has three children and resides in Toronto.



David Balsillie

David Balsillie

David Balsillie has been appointed director, air resources branch, in the Ontario Ministry of the Environment.

Since December, 1983, he has been acting director of the branch. As director, Mr. Balsillie will be responsible for the development and implementation of ministry policies designed to protect the monitor air quality.

Born in Toronto, Mr. Balsillie studied at the University of Toronto and graduated with a B.Sc., life sciences, in 1967; a M.Sc., botany, in 1968 and a Ph.D., forest pathology, in 1972.

He joined the Ontario Civil Service in 1971 and was posted as assistant plant pathologist with the Department of Energy and Resources Management in Sudbury. On formation of the Ministry of the Environment he was transferred to the phytotoxicology section of the new ministry in 1972.

In 1974 Mr. Balsillie became chief, air quality assessment in the Northeastern Region of Environment Ontario and was appointed, in 1981, supervisor of the atmospheric research and special programs section of the air resources branch.

Mr. Balsillie has been active on numerous Government of Ontario and federal-provincial committees.

Mr. Balsillie is married, has two sons and lives with his family in Georgetown.

James Bishop

James N. Bishop has been appointed director, water resources branch, for the Ontario Ministry of the Environment.

As director, Mr. Bishop will be responsible for the development and implementation of ministry programs designed to protect and upgrade water quality, to develop water resources, to conserve available water resources and to protect the public from contaminants in water and in fish.

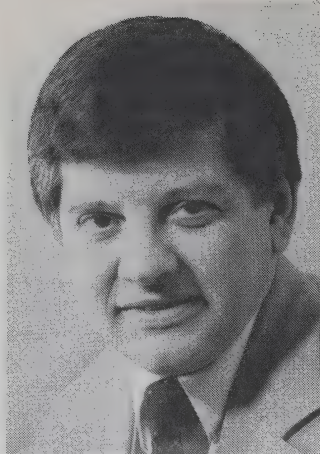
Mr. Bishop was born in Trail, B.C. and graduated with a B.Sc., in chemistry from the University of Alberta in Edmonton.

He started his career in the analytical laboratory of Cominco in Trail. He joined the Ontario Civil Service as chemist in charge of the inorganic laboratory of the Ontario Water Resources Commission in 1966.

In 1972 he became scientist in charge of inorganic trace contamin-



James Bishop



Boris Boyko



Linda Stevens

ants analysis with the Ontario Ministry of the Environment. In 1974 he became manager of the inorganic trace contaminants laboratory and in 1976 manager of the air quality laboratory.

In 1978 he was appointed manager of the trace contaminants section and was assistant director of the laboratory services branch.

Mr. Bishop has written numerous papers and technical reports and has lectured on atomic absorption spectroscopy. He is a member of the Ryerson Advisory Council and of various government working groups and task forces.

Mr. Bishop is married, has three children and lives in Brampton.

Boris Boyko

Boris I. Boyko has been appointed director of West Central Region for the Ontario Ministry of the Environment.

As regional director Mr. Boyko will be responsible for delivering ministry programs designed to protect air and water quality, to manage the disposal of wastes, to ensure an adequate quality of drinking water and to control the use of pesticides.

Mr. Boyko joined the Ontario Civil Service as a wastewater treatment engineer with Ontario Water Resources Commission in 1965. In 1972 he became supervisor of the wastewater treatment unit of the research branch of the Ontario Ministry of the Environment.

In 1975 Mr. Boyko was appointed manager of the technology and market development section of the resources recovery branch and was later named supervisor of the recovery unit of the branch. Mr. Boyko also managed the industrial section of the waste management branch.

Mr. Boyko's past achievements include the implementation of Ontario's phosphorus removal program, the start-up of the ministry's experimental plant for resource recovery and the preparation of programs for the management of hazardous wastes.

Born in Saskatchewan, Mr. Boyko graduated with a BA.Sc., from the University of Toronto and M.Eng., from McMaster's University.

Mr. Boyko lives in Clarkson.

Linda Stevens

Linda L. Stevens has been appointed director, environmental assessment branch, effective April 16,

1984. Prior to this appointment, Ms. Stevens worked with Program Review, Management Board of Cabinet.

In her new position, Ms. Stevens will be responsible for the administration and co-ordination of the environmental assessment activities under the Environmental Assessment Act and other applicable legislation.

Ms. Stevens, a native of Nova Scotia, attained a Masters degree in Environmental Studies and a Honours Bachelor of Arts degree from York University.

She joined the Ontario Government in 1971 and has held a number of planning and administrative positions with the Ministries of Housing, Municipal Affairs and Treasury, Economics and Intergovernmental Affairs.

In 1977 she became assistant to the Minister of Housing, in 1978 assistant to the Minister of Industry and Tourism and in 1979 director, Eastern Division, with the Ministry of Municipal Affairs and Housing. Ms. Stevens was appointed director, housing field operations branch, of the same ministry in 1982.

Ms. Stevens enjoys fishing, snowshoeing and skiing and lives in Toronto.

Gold mining and environment

Controlling the Hemlo fever

By John Steele

Photos by John Steele and Ron Johnson

Under the cold temperatures of a northern Ontario winter lies the fever of a gold rush — the Hemlo gold rush.

The communities of Marathon, White River and Manitouwadge are ready for the rush of miners and prosperity and the possibility that the new development may tarnish that glitter by adversely affecting people's lives and their environment.

"Hemlo will be one of the largest gold mining operations in the world," said Wally Vrooman, Environment Ontario's northwestern region director. "Gold means wealth, but its mining can have negative effects on a community and the environment. It is up to the companies and the government to ensure that this does not occur."

Hemlo, named after a Canadian Pacific Railway division point, is centrally located between Marathon, White River and Manitouwadge.

Gold mining is about to begin, but before it can start, the mining companies must address the environmental issues.

Three companies are involved at Hemlo — Noranda Mines Ltd., Tech Corporation and Lac Minerals Ltd.

To date, only Noranda has made a formal proposal to Environment Ontario. Noranda's plans call for a 1,000 tonne-a-day operation by January 1985, expanding to about 3,000 tonnes a day by 1987. The operation will also include milling facilities.

"Noranda has given the ministry environmental engineering plans for their mining and milling operation," said Jim Drummond, Thunder Bay's industrial abatement district officer. "We have reviewed their plans and asked for some changes based on our concerns. We also have asked them to seek public input to their proposal."

Under Sections 23 and 24 of the

Ontario Water Resources Act, the Ministry of the Environment must approve all industrial effluent discharges and water-taking to and from water courses. It is the ministry's policy to have the companies seek public input into any major operation that may have an effect on the environment.

Noranda, which also has a mine in Manitouwadge, scheduled informational and public meetings in early 1984 to inform area residents of its plans and to listen to possible concerns about the effect of the development on the environment.

studies started in 1982

Noranda began baseline environmental studies in November 1982, to characterize the natural and socioeconomic setting of the Hemlo area. The company looked at water quality and flow, fisheries, land use, wildlife sensitivities, rare and endangered species, terrain conditions, local climate and archaeology. It also reviewed the effects of the development on neighboring communities. The results of this work were used to develop environmental plans for the Hemlo operation.

Environment Ontario has done studies on water courses near the Hemlo area. Most of the lakes are off the beaten track and staff must use helicopters to collect samples.

"The water quality in the area is very good," said Jake Vander Wal, Environment Ontario's northwestern region chief, water resources assess-

Hemlo gold is special

The Hemlo gold rush is different than most major finds. For one thing, the gold was discovered over a century ago in 1869, when Moses Pe-Kong Gay found two gold areas near the present hamlet of Heron Bay.

In the 1920s a number of test pits were dug on the property and in 1931 J.E. Thompson, a geologist with the Ontario Department of Mines, mapped the entire region. He recommended the Hemlo site for detailed gold exploration. His recommendations were largely ignored.

In 1980, prospectors Don McKinnon and John Larche oversaw the staking of 12,000 claims in the Hemlo area. But nothing else happened until Murray Pezim, a promoter with a knack for raising risk capital, turned his energies and talents to the Hemlo area. He put Hemlo on the map as one of the largest gold finds anywhere.

Gold usually comes in veins or nuggets, but not at Hemlo. Here gold is dispersed as tiny yellow sparks throughout the ore. It takes four tons of this ore to produce one ounce of gold.



Wally Vrooman, Environment Ontario Northwestern Region director (left), Maxine Wiber and Frank Frantisak of Noranda tour the company's mining and

milling site. The structure in the background is the headframe of the mine.



Noranda's giant mining and milling project at Hemlo.

ment. "It is excellent for most recreational activities."

The ministry's main concerns are Noranda's tailing areas, its effluent treatment and its water quantity needs.

Tailings are what pulverized ore becomes after the removal of the gold. They can contain high levels of process chemicals used in the extraction process. Noranda's tailings will contain cyanide and various heavy metals.

Tailings are piped to specially constructed holding ponds where the heavier parts of the slurry settle out. The liquid can spill out untreated into lakes, rivers and groundwater unless it is properly dammed.

"A good tailings area must be well confined and kept away from sensitive water courses," said Leslie Kende, Environment Ontario's supervisor of approvals for northwestern and northeastern Ontario. "A company must be prepared to protect and maintain the system long after the mining operation has closed. Early mining operations used to dump tailings into lakes and this destroyed the lakes and surrounding water courses."

Noranda's chosen tailings area is in a small valley just west of Cedar Creek. The main dam is designed to ensure stability and to limit seepage. Seepage that does bypass the main dam will be intercepted in a seepage collection ditch and pumped back to the tailings pond.

During operations, the tailings area will be monitored continuously by computer and the area will also be inspected daily by Noranda's staff.

Noranda has received a conditional certificate of approval for its tailings area for the first three years of operation. At the end of the three years, it must supply Environment Ontario with further information before continuing with the operation.

Of major environmental concern is the treatment of waste water and the discharge of effluent to a receiving stream.

The proposed effluent treatment system uses modern technology to re-



Jake Vander Wal, chief, water resources assessment for Environment Ontario's Northwestern Region (at the microphone) and Jim Drummond, district officer, answer citizen's questions at a public meeting held in Manitouwadge.

The people get involved

Major gold finds occur in isolated areas as in the Klondike, or at Red Lake, to name a few. Hemlo is the exception.

The surface structures of the new mines will be visible from the Trans-Canada Highway. For the people living close by in Marathon, Manitouwadge and White River, gold can mean wealth, prosperity and excitement. It can also change their lifestyle and can have an impact on their environment.

"People can feel powerless during a major development like a gold rush," said Dr. Keith Neuman, Environment Ontario sociologist. "It is important that they have a say in the decision-making process that will ultimately affect them and their environment."

Under Sections 23 and 24 of the Ontario Water Resources Act, in-

dustry must first receive ministry approval before constructing water or wastewater systems. Environment Ontario also asks companies to seek public input into their environmental programs for any major development. At Hemlo, the three major mining companies will seek public input before they receive approval for their operation.

"The residents of the communities surrounding Hemlo were there long before the gold was found and will be there long after the mines have closed down," said Wally Vrooman. "These companies not only bring prosperity to communities but they also use those communities' natural resources. That's why we ask the companies to take their proposals directly to the public."

Of the three mining companies



currently involved, only Noranda has to date applied to Environment Ontario for the various approvals required under the Ontario Water Resources Act. The company has offered its engineering plans for technical review by ministry staff and was required to seek public input.

On February 8, 1984, Noranda held a public meeting in Marathon to discuss its engineering plans for the protection of the natural environment from their operation. Sixty people attended the meeting at the Moose Hall. Gil Leathly, Noranda's mine manager, described his company's plans for protecting the lakes and rivers in the area.

Jim Drummond, an Environment Ontario district officer, represented the ministry at the meeting. Most of the questions he was asked concerned the effect of mine effluent on the White River System, a fishing and hunting area.

Noranda had been asked by Environment Ontario to place its treated effluent in the White River system rather than the closer Black River system, because the White is larger and an Indian band located

close to Pukaskwa National Park takes its drinking water from the Black. Noranda's effluent will contain cyanide and other heavy metals, but these contaminants will be kept below the ministry's water quality guidelines.

40 residents listened intently

At a second meeting on February 9, in Manitouwadge, about 40 residents listened intently but had only a few questions to ask.

"The Hemlo gold rush is great," said 24-year-old Sandra Kusins, a native of Manitouwadge and a new employee of Noranda. "It means jobs and more shopping and entertainment. But we must be aware of the possible environmental effects because this area is great for outdoor sports."

"Noranda has used the best available technology to control tailings and to treat water," Maxine Wiber, Noranda's environmental

co-ordinator for the Hemlo project stated. "About 15 per cent of our total production costs at Hemlo will go towards environmental programs."

Dr. Frank Frantisak, director of Noranda's environmental division, pointed to his company's environmental programs at its mines and smelters in Quebec and New Brunswick as examples of the company's commitment to the environment.

"When we put a resource development into a new country that does not have environmental regulations, we always use Ontario's standards, because they are the most exacting of any in the world," said Dr. Frantisak.

Environment Ontario will consider the input from the community when determining the conditions that will be placed on Noranda's certificate of approval.

"The public is one of Environment Ontario's main concerns," said Mr. Vrooman. "They must be given the opportunity to voice their views and opinions about this proposed development because ultimately they will be the people most affected by it."

duce contaminants to levels within Environment Ontario's guidelines. Water from the tailing area will be treated to remove cyanide and heavy metals before being discharged to Lim Lake, which is on the White River system.

"The large White River system can better accommodate mine effluent," said Mr. Vrooman. "This will ensure

the environmental integrity of the smaller Black River system, which is closer to Noranda's operations. It will also protect a drinking water supply on the system from possible contamination. We do not anticipate any adverse impact on sport fishing on the White River or on water quality in Pukaskwa National park."

The gold milling process requires

vast amounts of water. "There is no shortage of water in the area," said Mr. Vander Wal. "But the companies must also consider the needs of others."

Noranda, Tech and Lac have been asked by Environment Ontario to carry out a water supply study to formulate a proposal for government approval. The study will focus on the

Getting ready for growth

Marathon, White River and Manitouwadge will all benefit from the Hemlo rush. Marathon and White River are forestry towns, while Manitouwadge is a mining town. Noranda's Geco mine is still in operation near Manitouwadge, while Lac Minerals' Willroy mine was closed a few years ago. Ontario Paper also has an operation in Manitouwadge.

The gold boom could endanger other industrial operations in these communities unless the new mines are properly planned.

Marathon has hired a development manager to see the town through the growing period. The mining companies expect the town's population of 2,300 to double in a short time. This could cause a strain on the community's sewage and water treatment facilities and on the sanitary landfill site. The town's current water supply is from three drilled wells and an elevated storage tank.

"Marathon's water quality is excellent," said Environment Ontario's Wally Vrooman. "A fourth municipal well and pump and a new water storage tank are currently being planned because of the expected increase in population."

In 1982, Marathon opened a new sewage treatment plant and

this removed all residential growth restrictions. The plant, operated by Environment Ontario, is run at about one-half design capacity. A simple addition could easily accommodate the initial growth rate of the community. Additional trunk sewers and a sewage pumping station may be required to service new, larger subdivisions.

Marathon's current landfill site will be closed and a new site will be found. This future site will be developed under the Environmental

population to double

Assessment Act to ensure its environmental soundness.

Manitouwadge is the largest community of the three towns. Its population of 3,300 is expected to double because of Hemlo. It has a head start because it is an existing mining town.

The town takes its water from area wells and is only using about one half of the wells' capacity. Reserve pumping capacity is also available. Water supplies are adequate for the expected initial increase of population.

Manitouwadge does not have a sewage treatment plant, but the town has hired an engineering consulting firm to begin work on the plan to serve the current and future population. Currently, the town has a sewage collector system, a sewage pumping station and a large communal septic tank system.

The town has a landfill site with an incinerator, but plans to close both. A new landfill site will have to meet the requirements of the Environmental Assessment Act.

White River, the smallest of the three communities, will be getting a new water supply source, distribution system and an elevated storage tank. The town has a relatively new sewage treatment system, but a new sewage collection system will be built. The community's current sanitary landfill site has enough capacity for the expected limited population increase.

"From an environmental position, the three communities are prepared for the Hemlo development," said Mr. Vrooman. "Mining in the eighties has become far more sensitive to environmental issues and we all have learned some valuable lessons from past experience."

ability of the Cedar Creek system to satisfy the requirements of the ministry, especially the maintenance of a minimum water flow in the creek, the interests of mining operation and of the cottage owners along the shores of lakes upstream of the mine. Water level regulations are being considered as a means for increasing water flow in Cedar Creek.

Noranda has received approval to construct domestic sewage treatment and drinking water plants. The company is also committed to a program of reclamation and of stabilization of the mine site after the mine has been closed. ◇



Dale Goldhawk of CBLT-TV interviews Environment Ontario district officer Jim Drummond about the environmental aspects of the Hemlo project.



The flow of water in Cedar Creek will have to be enlarged and controlled to satisfy the requirements of the mining industry.

Corporate conscience in action

A Legacy special report

A modest second floor office overlooking a Sarnia shopping centre is headquarters for what has been called the corporate conscience of Chemical Valley, the Lambton Industrial Society.

For 32 years the society and its predecessors have kept watch over the local environment through programs to monitor the quality of air and water. Members point with pride to the fact that their organization predates the Ministry of the Environment by 20 years.

The founding members of the society were Imperial Oil Ltd., Dow Chemical of Canada Ltd. and Polymer Corp. Ltd. (now known as Polysar Ltd.).

Over the years they were joined by Cabot Carbon of Canada Ltd., Canadian Industries Ltd., Dome Petroleum Ltd., DuPont of Canada Ltd., Ethyl Corp. of Canada Ltd., Fiberglas Canada Ltd., Interprovincial Pipeline Ltd., Monsanto Canada Ltd., Petrosar Ltd., Shell Canada Ltd., Sunoco Inc., Tricil Ltd. and Union Carbide of Canada Ltd. Monsanto Canada has since closed its Sarnia plant.

Their activities have set a pattern for enlightened industries elsewhere. Lessons learned in Sarnia were applied in the formation of the Laval Industrial Society in Quebec and the Strathcona Industrial Association in Alberta.

In 1952, with the support of three industries, the society's budget was \$9,000. In 1984, with 15 industries, expenditures approach \$1 million. The society's reputation has travelled. Inquiries have come from industrial groups as far distant as Poland and Venezuela.

The society is operated by a board of directors composed of plant managers from member companies. It has a technical committee drawn from the ranks of company environmental officers. Meetings are held periodically with local staff of the Environment Ministry.

Day-to-day administration is carried out by a full-time staff of two, a manager and a secretary. The present manager is Ronald Denning, a former science teacher and officer of the Monsanto company.

Earlier this year, Mr. Denning succeeded Dr. James McCoubrey, a chemical engineer who retired at age 70 after 13 years in the job. The first manager was H. Mason Jones.

Society members regard themselves as private sector partners of government in providing the expensive science

that anticipates environmental problems and leads to their solution.

A major objective, as stated in their charter, is: "To promote and foster joint and individual effort by member industries in the fields of education and research to achieve control of industrial pollution of air, soil and water consistent with standards set by the government regulation and good corporate citizenship."

An extensive network of air monitoring stations and regular research into the state of the St. Clair River complement the work of the Environment Ministry. Air monitoring is provided under contract by the Ontario Research Foundation and water monitoring by Pollutech Limited.

air quality improved

Members, when they periodically assess progress, are pleased with the results: although industry has expanded, air quality has improved. The river exhibits robust health; entries in a local fishing derby recently soared to record levels.

The society doesn't claim full credit. Its work and that of the Environment Ministry are regarded as complementary. Industry has adopted a long-range view; ministry officers are busy with more immediate matters.

The philosophy that governs the society's activities was summarized by W.H. McKee of Fiberglas Canada, a past president:

"The Lambton Industrial Society has grown out of our mutual concern for the environment and the community. It serves not only as a forum to exchange environmental information and to discuss common environmental problems, even though many of us are competitors, but also functions as a kind of industrial council.

"By that I mean we will not interfere in the activities of individual companies, but we cannot and will not relieve any individual company of its responsibilities for the environment. In other words, 'We live here too'."

The society's most ambitious project has been LIMA — the Lambton Industrial Meteorological Alert, which went into operation in the spring of 1981 at an initial cost to members of \$300,000. Its object is to give early warning of air quality problems.

Sulphur dioxide problems in Chemical Valley are affected by two factors: a number of emitting industries aligned along the St. Clair River south of Sarnia, and adverse weather conditions which produce sustained directional winds for extended periods and cause a gradual buildup.

model of cooperation

LIMA is intended to protect both the Sarnia area and Port Huron, across the border in Michigan. Sulphur dioxide levels are recorded continuously at two stations in Sarnia and others at nearby Corunna and at Port Huron.

Data from the four stations are telemetered to the Environment Ministry's air resources branch in Toronto along with current weather conditions.

Should concentrations increase to a set level and weather conditions remain unfavorable, a meteorological officer can declare a LIMA alert and the ministry's Sarnia office notifies selected industries to reduce their emissions.

LIMA has been a model of co-operation between industry and government. The alert system was designed by the Environment Ministry and is enforced by a regulation added to the Environmental Protection Act.

The Lambton Industrial Society installed the monitoring equipment, computer and telemetering facilities and maintains and operates the system.

Doug McTavish, director of the Environment Ministry's Southwestern Region with headquarters at London, explained:

increasing sophistication

"The LIMA system is a fine-tuning mechanism designed to control sulphur dioxide emissions from specific sources at certain times.

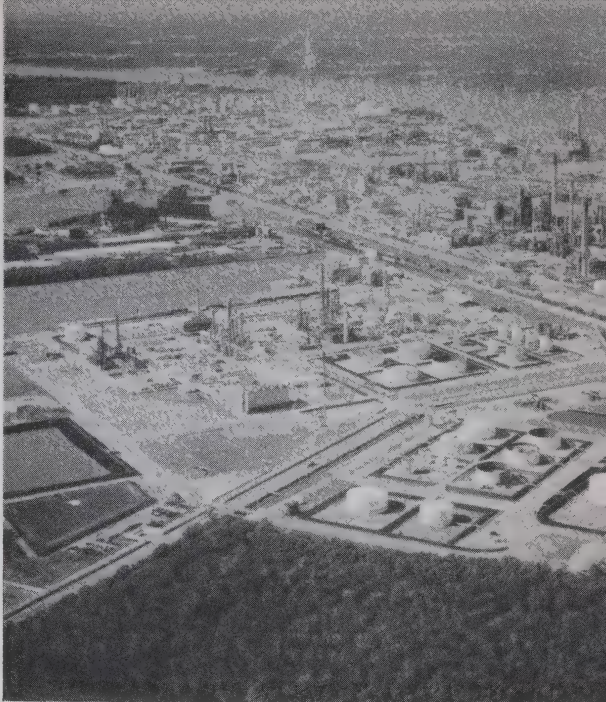
"The ministry's Air Pollution Index, which was installed in Sarnia six years ago, is a general tool designed to measure both sulphur dioxide and particulate matter.

"LIMA gives us an added control over the Chemical Valley area and this will ultimately lead to cleaner air for Sarnia, Corunna and Port Huron."

Harry McAdie, a scientist with the Ontario Research Foundation, remembers an era in Sarnia before air monitoring had reached its present state of sophistication.

The objectives of the initial survey, he said, were simply to find out what was in the air, how much, and how to get rid of it.

Measurements of carbon dioxide were obtained from a network of dust-fall buckets provided by Imperial Oil and Polymer. More buckets were added to cover locations in the downtown area.



(photo: Haines Graphics)

This aerial view of Sarnia shows the density of industrial development in the area.

"Of course," Dr. McAdie recalls, "these data were only as reliable as the direction in which the birds were perched on the edges of the buckets."

Something better was needed. It took the form of a 10'-by-10' uninsulated shack established in Tecumseh Park to serve as office, measurement site, repair depot and storage facility for the survey.

"In winter," says Dr. McAdie, "the temperature gradient from floor to desk top approximated 30°F while, for sanitary convenience, we had to depend upon the generosity of the local Esso service station."

A second instrumented trailer was added, then a 200-foot meteorological tower. "The cups of the windspeed-measuring instrument, whirling at the 200-foot level were a tempting target to local marksmen."

Eventually, accommodations were obtained in the old Point Edward Customs House, the former site of a fish hatchery, "which you couldn't overlook."

Dr. McAdie remembers: "Indoor plumbing was now a reality ... We could also enjoy the rehearsals of the Lionettes marching band in the other half of the building."

Great benefits flowed from those pioneering efforts. As Dr. McAdie now says, many years later:

"In contrast to most other industrial associations, the Lambton Industrial Society, because of its early start, has had the opportunity to evolve a monitoring program based upon first-hand experience."

Canada is impatient with American delays

TORONTO — Acid rain threatens to destroy aquatic life in thousands of lakes and rivers and cause billions of dollars in irreparable damage to forests and property.

Principally threatened are the Adirondacks in New York, almost all of New England and large areas of Ontario, Quebec and our Maritime provinces, including some of the finest fresh water recreational areas in the world.

The controversy over an action program to reduce sulfur dioxide emissions is one of the principal issues between our two nations. I prefer to think of it as a disagreement between neighbors which will ultimately be solved since, after all, it is in our mutual interest to do so.

But Canadians are impatient with what we see as American reticence to take necessary measures to reduce emissions.

Our scientists believe we already know enough about acid rain to justify a major abatement program. Joint action to curb emissions in both countries is needed immediately.

Canadian efforts alone cannot solve the problem. Fifty to 70 percent of the acid rain falling on Canada's most vulnerable areas originates at U.S. sources, principally utilities in the Ohio Valley. Especially affected are sensitive areas of Northern Ontario where thousands of Americans vacation.

A Memorandum of Intent signed in 1980 committed both nations to the development of action aimed at reducing sulfur dioxide emissions. But little progress has been made.

A body of American opinion,

Andy Brandt is Ontario's minister of the environment.

including the administration, believes we do not have enough scientific knowledge. We agree that additional information about acid rain would be valuable and we are continuing Ontario's own research at a cost of \$8 million a year.

But we believe we already have enough scientific proof on which to base a joint abatement program. To await the results of further research will only delay action.

The Canadian provinces concerned have agreed to accelerate programs to reduce our emissions of sulfur dioxide 50 percent by 1994. This will require reductions of 2.6 million tons annually from our principal sources, including non-ferrous smelters and coal-fired electrical generating stations.

But even this will only take us part way to the target of 18 pounds per acre per year, identified by scientists as acceptable for sulfate depositions on all but the most sensitive areas. We must have similar reductions in U.S. emissions in order to get to the acceptable level in U.S. areas affected by acid rain as well as those in Canada.

Canada's provinces and federal government believe we must act to save our fresh water recreational areas and our forests and buildings from irreparable damage. We know that our neighbors in the United States must work with us in this joint effort. I am hopeful that this American decision will be made in the near future.

QUOTELINES

"The president is not going to ask the American people to throw billions of dollars into purported remedies until we all understand it better."

— Secretary of the Interior William Clark

"Last year, the administration's policy on acid rain was more research. Today, the administration's policy is more research — but at twice the price."

— Sen. Robert Stafford, R-Vt.

"Before launching an expensive and potentially divisive control program, we need more scientific information."

— EPA Administrator William Ruckelshaus

"We know more about acid rain now than we did about air pollution when the Clean Air Act was passed."

— Sen. George Mitchell, D-Maine

"It is clear, at this time, there is no significant data that show acid deposition hurts trees."

— Dr. Ely Gonic, International Paper Co.



reports on acid rain

The U.S.A.'s only nationwide daily newspaper, USA TODAY, devoted a full page of its March 19, 1984 issue to the debate on acid rain. Because of the different format, the page has been reassembled but the features have not been changed.

JOSEPH DOWD

Guest columnist

Acting too quickly will be real disaster

COLUMBUS, Ohio — There is no solid assurance that the multibillion-dollar proposals offered to combat the effects of acid rain are directed at the right target or will do the job they are intended to do.

Midwestern electric utilities have already cut their sulfur dioxide emissions by about 20 percent since the mid-1970s.

In Ohio alone, electric utilities invested \$1.8 billion in air pollution control equipment through 1982. This is 15 percent of all the investment in such equipment made nationally up to that time. But despite this effort, there has been no perceptible change in the acidity (as measured by pH) of rainfall in the Northeast.

What reason is there to believe that additional substantial and costly reductions in Midwestern sulfur dioxide emissions will produce significant benefits in the Northeast?

Furthermore, even without acid rain legislation, utility sulfur dioxide emissions are projected to gradually decline as new, better-controlled plants replace existing plants.

The acid rain bills being most actively considered in Congress focus very heavily on emissions from Midwestern sources — 300 to 700 miles from the environmentally sensitive areas. But the National Academy of Sciences said last June in its study that current scientific inadequacies make it impossible to determine the relative influence of distant versus local emission sources.

If legislation imposes drastic emission reductions on Mid-

This opposing view is by Joseph Dowd, senior vice president for American Electric Power Service Corp.

western sources and it is later determined that local sources are the primary contributors, hundreds of billions of dollars will have been wasted.

Lakes are the focus of the acid rain concern. Yet there is a growing body of scientific opinion that regards soil conditions, rather than acid rain, as the principal contributor to lake acidification.

In many areas of the Northeast, the forest floor is five to 10 times more acidic than the rain that falls upon it. As the rain filters through the forest floor it picks up this acidity before flowing into the lakes.

Thus, even if emissions from all sources are drastically reduced, there is a strong possibility that runoff into the lakes would still be acidic. If this proves to be the case, hundreds of billions of dollars will have been lost on an unscientific gamble — and the people of our industrial heartland will have been the biggest losers.

We advocate increased and accelerated study. And, cost-effective mitigation measures such as lake liming should be instituted promptly to restore and protect selected lakes.

But where multibillion dollar annual costs are involved — as some in Congress and elsewhere propose — there must be at least reasonable assurance that significant benefits will result. Such assurance currently is lacking.

Act now to stop man-made disaster

For centuries, the pitter-patter of rain on roofs has been a universal lullaby. But today air pollution has transformed that soothing rainfall into a vinegary brew boiling its way through precious natural resources.

Acid rain is caused by electricity plants, smelters, and cars that spew sulfur dioxide and nitric oxide into our skies, where they become sulfuric acid and nitric acid.

Those acids wrap tree-covered mountains in sour clouds or fall to earth, where they sap life from lakes and streams, leach fertility from soil, and gnaw away at buildings, bridges, monuments, and human vitality. For example:

■ The red spruce and Fraser firs on Mount Mitchell, N.C., used to live for four centuries; now they are dying before their 50th year.

■ Scientists, who have known for years that acidity destroyed life in hundreds of lakes in the Northeast, have discovered increasing acidity in the lakes of the Colorado Rockies.

■ One of every three smallmouth bass pulled from some lakes in Georgia and North Carolina has been deformed.

■ Acid smog in Los Angeles is sometimes as caustic as lemon juice.

■ Human lead levels in some Vermont towns are six times the EPA allowance; experts say acid rain releases the lead from pipes into drinking water.

In all, acid rain has caused environmental damage in 31 states. Last week, a Senate committee approved a bill calling for a phased reduction of air pollution.

Those who oppose immediate action say the evidence is insufficient to warrant spending billions on a clean-up. The cost is phenomenal. But so is the cost of the damage attributed to acid rain.

They argue that a clean-up's costs will strike at the nation's heartland, where most of the giant utility plant smokestacks are located. Obviously, one region should not have to absorb the entire cost of reducing emissions; neither can another region be expected to serve as a dump for its neighbor's pollution.

Some even say that part of the damage can be traced to nature itself. But we can't do very much about drought, frost, sensitive soil — or any natural disaster. We can do something about this man-made disaster.

We can reduce air pollution. We can begin to restore our damaged lakes and forests. We can continue to study the damage air pollution causes and find better remedies than we have now. And we can figure out ways to fairly share the costs of reducing pollution and cleaning up.

What we cannot do is wait. Even if action began today, it would be at least five years before it did any good. For far too many of our lakes and trees, that will be a lifetime.



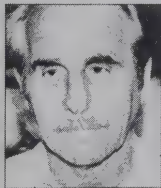
(Because of differences in format, the page had to be rearranged but the opinions expressed have been left unaltered. — Edit.)

VOICES FROM ACROSS THE USA/Do you think pollution is a serious problem in America?



CATHERINE COSTA, 57
State Senator
Wallingboro, N.J.

As vice chairman of our Senate Energy and Environment Committee, I know that acid rain is a serious problem. And as a legislator, even though I may make laws regarding pollution control, the problem really has to be addressed by the entire industrial Northeast. The media have brought the problem to the forefront.



EDWARD HITZEL, 48
Store owner
Queens, N.Y.

They just discovered a big chemical waste site in Brooklyn, and a sanitation person was charged with accepting bribes to let the trucks dump illegally. When I look over into Manhattan, there's a big haze over the island. When I look up Long Island, the sky is blue. The difference is, quite literally, like night and day.



NANETTE BETHKE, 22
Secretary
De Pere, Wis.

The problem will only get worse. It's the people who either don't realize or don't care about environmental pollution who are causing the problems. Granted, there are some of us who genuinely care about a clean environment, but many don't. I'd never want to live in a large city. There's too much smog and it's unhealthy.



CELE BERKMAN, 59
Writer
Dallas, Texas

I consider the Great Lakes one of our national treasures. I consider the air we breathe and the water we drink humanity's treasures. They cannot become extinct, and they should not be threatened. Water and air are elemental. They, like the Great Lakes, need to be salvaged. Without them, we cannot live.



STEVEN LARKINS, 22
Clerk
Lansing, Mich.

If we're going to live in an industrial society, we have to be prepared to deal with pollution. It's not that severe a problem yet, because it's carefully controlled. Michigan is trying to keep the Great Lakes clean. Frankly, there are other things that concern me more. Going to a war worries me more than pollution.



JANET CUNNINGHAM, 49
Assistant account executive
Charlotte, N.C.

We're overreacting to acid rain. Of course it's a severe problem, but as a city dweller, I'm more concerned about other forms of pollution — like automobile exhaust and litter on the streets. Acid rain is a concern to some — farmers, maybe — but it doesn't hit home as hard as other forms of pollution.

History of water treatment

Ontario's quest for clean

By Robert Koci and Denise Munchee



Outhouse, well, pigsty and the site on which most of the kitchen slop was disposed of were often kept close together for convenience.

Although more than three years have passed since the United Nations declared the Eighties as the World Water and Sanitation Decade, little attention has been paid in Ontario to this international effort to provide abundant clean water to the world's peoples.

The main reason for this lack of interest is that the 98 per cent of Ontario's inhabitants who receive all the water they want at the turn of a tap, simply take their supply for granted.

According to a recent report of the World Health Organization, diseases associated with dirty water kill 50,000 people every day — or more than 18 million people a year. In Ontario, no death has been associated with water-borne disease epidemics for at least 20 years.

Even in this province, blessed by access to about one fifth of the world's fresh water supply, it has not always been so.

The first settlers arriving 200 years ago in what is now Ontario had it easy. The land grants they received generally included a stretch of shore on a watercourse, and water was readily available.

Some farmers built wharves extending out into the stream to reach clear, running water. "Any one who has been in the habit of drinking this water can never forget its peculiar flavor, although it tastes good when you are thirsty", writes a "Canuck" in a book on Early Pioneer Life in Upper Canada about the Niagara River water.

Why the water should have a peculiar flavor is not very clear. Before the arrival of the first settlers the land has been occupied only sparsely by nomadic or semi-nomadic Indian tribes, and the water was free of industrial or other unhealthy effluents.

The later arrivals found most shores occupied and resorted to the abundant

Toronto's first water reservoir on Rosehill (Yonge St./St. Clair Avenue



n water

groundwater supply. To reach it they dug wells, generally to a depth of six to eight metres (20 to 25 feet).

The first pumps were made by boring lengthwise through a tamarac or pine log. A rod ran through the hollowed out log at the lower end of which was a sucker made of leather with a valve which allowed the water to flow through when the plunger was lowered and which closed as the plunger was brought up.

A curbing or box arrangement was put around the top to prevent anyone from falling in. A pole with a crook at one end for hanging a pail on was used to get at the water. Deeper wells had a rope and windlass system for drawing up water.

Another means of drawing water was called a "sweep". It consisted of a long pole with a heavy end fitted in a post with a crotch. The light, longer end had a pole attached to it long enough to reach to the water in the

well. On the end of the pole hung the bucket.

Another common pump system was the chain pump. In it a chain is run through a pipe and water is brought up by "buttons" placed at intervals along the chain.

The water, however, was not always as clean as it could have been. There was no public health officer around to test its quality, and the "flux" was a very common illness. The reasons are evident from a description of the life of Dirk McQuinn's farm in Bruce County: "The well was usually close to the house, for convenience, as were the barnyard, the chicken coop, the pig sty and the privvy..."

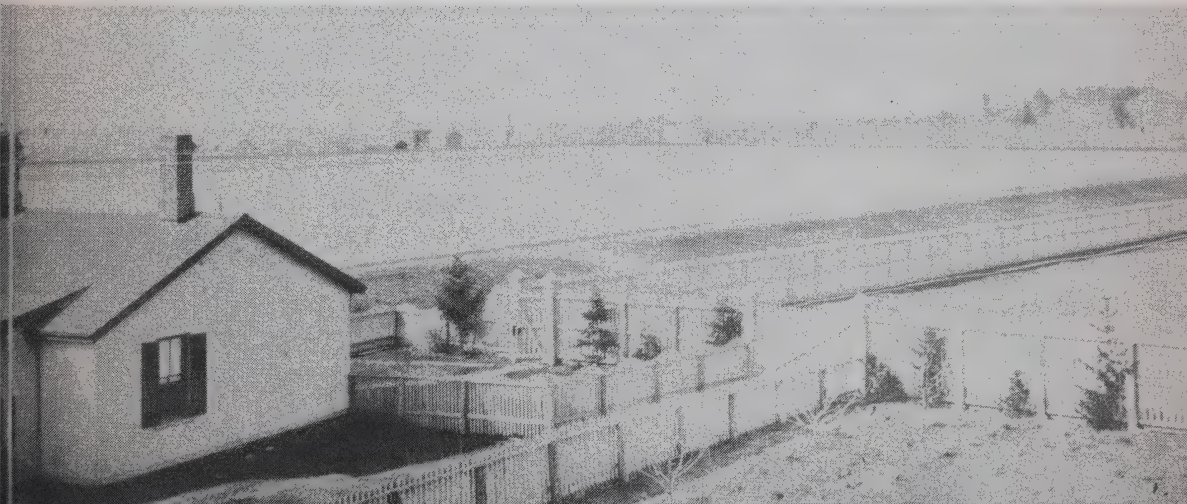
The description of McQuinn's farm dates from about 1870, but the conditions applied to many settlements throughout the 19th century.

The first piped water supply in Ontario was established in



The Rosehill reservoir in 1984.

as it looked on completion in 1875.





A homemade pump made by boring out a pine log — and its proud constructor and owner. The photo was taken about 1880 and has been provided from the large collection of historical documents collected by Dave Thomas, water works supervisor in Parry Sound.

1837 in Toronto as a private operation by Albert Furniss. The water was pumped without treatment from Lake Ontario.

The system's main task was to provide water for fire-fighting. By 1856 only 11 per cent of all houses in Toronto were drawing Furniss's water for domestic use, and many users complained frequently about it.

That the taste and smell of water can be improved has been well known since the dawn of civilization. A collection of East Indian medical lore from about the year 2000 BC recommends keeping water in copper vessels, exposing it to sunlight and fil-

tering it through charcoal or sand and coarse gravel.

Egyptians, Greeks and Romans used settling ponds and added lime or aluminous earth as precipitants and filtered water through earthenware jars. Roman emperor Nero believed that water was more wholesome when it was boiled.

It wasn't until the 1850s that scientists began to suspect that water might carry disease. The suspicion arose in Britain after an epidemic of cholera that claimed nearly 250,000 lives between 1845 and 1849. In 1853 the disease swept the London area again, claiming 11,000 lives. An investigation traced the first 69 deaths to a public supply well. A pipe draining a cesspool into the well was found to be the source of the contamination.

Knowledge, however, spread slowly. The water supply system built in Kingston in 1849 was the first in Ontario to be equipped with a filter at the intake crib. An epidemic of cholera and a rash of fires in Hamilton in 1854 led to the construction of water works with an improved filtering system.

eration. Of these, 66 were run by municipalities.

In Toronto, improvements to the water supply became of special interest to the citizen after the great fire of 1904, and ratepayers authorized \$1 million for improvements. In 1909 slow sand filtration and electric pumps were installed at the Toronto Island waterworks. Chlorination, started in 1910, resulted in an immediate drastic reduction of typhoid fever, tuberculosis and infant mortality.

Since then the capacity of the Toronto waterworks has grown nearly 500-fold from 181,000 cubic metres (40 million Imperial gallons) per day to 2.2 million cubic metres (nearly 480 million Imperial gallons) per day in 1983.

In 1916 the federal Commission of Conservation detailed in its report, Water Works and Sewerage Systems in Canada, the installation of every existing water system in the country. A random selection from the report illustrates the rapid development of water supply systems during the late 19th century:

1,378 typhoid deaths in 1912 in Ottawa

Municipalities at that time were not compelled by law to provide a water supply and usually deferred action until forced by a disaster.

In 1873 the municipality of Toronto took over the operation of the water supply from Mr. Furniss, expanded the distribution system to serve more houses, built the Rosehill reservoir and added to the John Street pumping station.

Toronto's example was followed by other communities in Ontario, and the construction of urban water works increased markedly between 1870 and 1879. By the turn of the century there were 110 water supply systems in op-

St. Catharines built a municipally-owned water works in 1879. The supply was by gravity from Lake Erie via the Welland Canal, and the water was purified by sedimentation and liquid chlorine treatment. The annual flat rate for water supply was \$3.50 to \$6 per dwelling, with an extra \$5 for a bathroom — if there was one. A metered rate was also available — 5 to 19 cents per 1,000 gallons.

The Ottawa system started up in 1874 and used the Ottawa River as its source. In the same year, Uxbridge, north of Toronto, installed a water supply for fire protection only. Insurance rates were much lower in communities with a piped water supply.

The London system started operation in 1878 and that in Guelph in 1879. The Sault Ste. Marie water works started operation in 1894, the one in Fort William — now part of Thunder Bay — in 1908. The annual cost for this supply was a flat rate of \$8 to \$14 per dwelling with an extra \$6 to \$10 for a bathroom.

The construction of waterworks and distribution systems solved some, but not all the problems. Frequently untreated sewage outlets and water intakes were placed close together and the result was a contaminated water supply. In Samia, for example, the sewage outfall and the drinking water intake were only 45 meters (150 feet) apart.

Such weakness of the systems showed up in Ottawa. The population of the city grew by 20,000 between 1905 and 1910. During the same period, 133 typhoid deaths were reported. In 1911 and 1912 Ottawa suffered especially severe outbreaks of typhoid, with 1,378 deaths in 1912 alone.

The epidemics were attributed to the decay of the city's piping; broken pipes allowed sewage and drinking water to mix.

Despite such setbacks, there was some progress. In 1882, the year of the formation of the Provincial Board of Health, 180 of every 100,000 people died of typhoid or similar diseases. Between 1903 and 1913 the typhoid death rate decreased to 24.4 per 100,000.

The improvement was the result of the work of a few devoted civil engineers whose achievements are generally overlooked in the annals of history. During the second half of the 19th century the most outstanding among them was Thomas Keefer.

Mr. Keefer constructed the Montreal water supply system in 1853 and the project became so successful that he was asked, during the next 25 years, to work as a consultant on water supply projects in many cities, among them Toronto, St. Catharines, Hamilton, Ottawa and London.

By 1915 Ontario led all other Canadian provinces in the amount spent



Thomas Coltrin Keefer (1821-1915) was one of Canada's leading hydraulic engineers of his time. The photo, taken in 1863, was adorned with sketches of Mr. Keefer's work. The numerous water works he built in many Ontario cities, however, are represented only by the drawing of a hydrant — quite appropriately, as at the time water works were primarily designed for fire protection.

for communal water systems as well as in the total amount of pipe laid. By then, the province had spent \$44.5 million (in 1916 dollars) for such projects, and had laid 4,253 km (2,643 miles) of mains which supplied, on the average, 527 litres (116 gallons) of

used wind power to pump water to households.

The real improvements, however, had to wait for the decade after World War I, the 1920s, and these improvements were the work of two outstanding Canadian civil engineers, Willis Chipman and Dr. Albert Berry.

Willis Chipman studied sewage and water works in the U.S., Scotland and England and became, after 1901, responsible for the design of more than 50 water and sewage works in Canada.

Dr. Berry was a visionary in the field of sanitation. He joined Ontario's Provincial Board of Health in 1920 and was the first to realize that to reduce the incidence of typhoid, bacteria had to be killed by chlorination of sewage and of the water supply.

improvements after World War I

water to each individual using the system. A total of 166 plants were in operation, of which 146 were run by municipalities and 20 by private companies.

Filtering and other treatment was, however, provided only in 37 water supply systems. For the operation of pumps, steam and electric power were generally used, although one plant



Dr. Albert Berry stood for many years in the forefront of Ontario's quest for pure drinking water. The photo

was taken in 1983 at Dr. Berry's home in St. Marys, Ont.
(photo: R. Koci)

Dr. Berry's vision also included the destruction of bacteria in milk by pasteurization. Through his efforts, Ontario became a world leader in the implementation of chlorination of water and pasteurization of milk.

The responsibility for ensuring safe drinking water was the mandate of the Provincial Board of Health. The board had to approve all municipal plans for water supply and sewage treatment systems.

In 1924 it was given full status as the Department of Health, and Dr. Berry was appointed, in 1926, director of the department's division of sanitary engineering. In this position he investigated a number of epidemics including TB, typhoid and paratyphoid.

water supplies taken from the Great Lakes were unsafe to drink.

In keeping with the ideas of Dr. Berry, the IJC reports recommended:

- a daily bacteriological examination of drinking water
- the treatment of all water supplies
- the installation of proper sewage treatment.

By 1930, 70 Ontario municipalities had sewage treatment plants and 237 municipalities had water works. The quality of the distributed water, however, varied widely.

In the following depression years construction of new systems ground to a halt, and few municipalities had the financial means to maintain water and sewage systems properly. What public money there was was spent on alleviating social problems.

During these years, Ontario's urban centres also experienced a constant growth, and sanitation and water supply systems did not keep pace with this development. The existing sys-

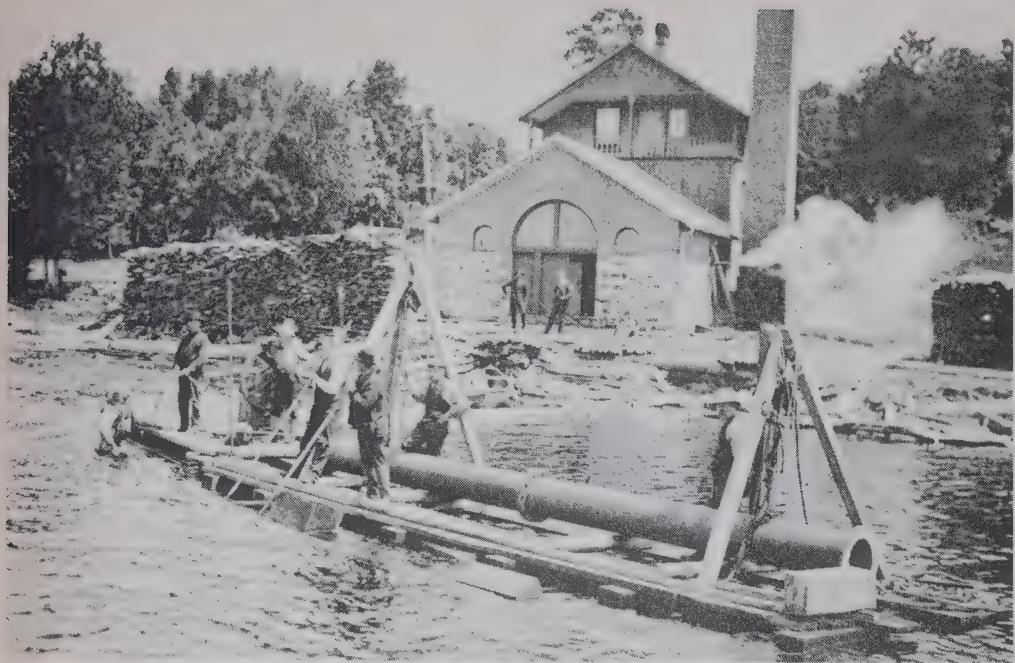
No complaints

When property owners complain about the water bill, David Thomas, waterworks supervisor in Parry Sound, has a good answer: "There is plenty of water around," he tells the complainant. "I will cut your water supply off and lend you these two pails for a month, free of charge. If, after a month, you still sincerely believe that the rate is too high, I will supply you water free for the rest of your life."

Since David started to work at the Parry Sound waterworks some 40 years ago, nobody has taken up his offer.

in 1930 — 237 municipalities had water works

Up to the first decade of the 20th century, all municipalities on the shores of the Great Lakes used them as a giant depository for all their sewage. The International Joint Commission, established in 1909, found after an extensive study that all municipal



The water intake of Parry Sound water works was placed in 1893. Note the staples of firewood to be used

as fuel for the steam engines provided to drive the pumps. (Photo from the collection of Dave Thomas.)



Interior of the filter of the Toronto water filtration plant built in 1911. The photo shows the under drains

and the first layer of gravel used as filtration medium.



Commission of Conservation

The crib at the end of the 48-inch water intake pipe of the Hamilton water works before placement into Lake Ontario in 1910.

tems became not only outdated, but also overloaded, especially as the onset of World War II and the booming production of materials used by the Allied forces brought a new source of contamination onto the scene: industrial waste.

The provincial government tried to help in 1943 by an amendment of the Municipal Act to allow municipalities to finance water projects by user rates rather than from general taxes.

In 1950, the newly formed Municipal Improvement Corporation provided to municipalities money for sanitary works at low interest rates. During the late Forties the addition of fluorides to drinking water for the prevention of dental caries was much discussed and as a result several water supply systems adopted fluoridation as an additional service.

By 1950 the typhoid death rate had decreased to 0.02 per 100,000 population. But another study undertaken

by the IJC between 1946 and 1949 revealed a three- to four-fold increase in bacteria levels since 1912 in some areas of the Great Lakes.

The oxygen demand of these industrial wastes was at the time estimated greater than the oxygen demand of the sewage produced by the 3.5 million people living in the study area.

To control the problem, Premier

OWRC established in 1956

Leslie Frost established the Ontario Water Resources Commission in 1956. The commission's mandate was:

- to build, finance and operate water treatment and sewage disposal systems, and
- to supervise and control the use

of the province's water resources.

The work of the commission brought a vast improvement in Ontario's water works. With Dr. Berry as chief engineer and general manager from 1956 to his retirement in 1963, the number of water works and sewage works in the province increased steadily and the quality of sewage and water treatment improved dramatically.

The value of certificates of approval issued yearly by the OWRC for improvements and extensions of existing water works and for the construction of new ones increased steadily from \$38.5 million in 1958 to \$77.6 million in 1972. The OWRC

financial help to municipalities

provided design, construction, financing and, if required, operators for these projects.

From 1969 on, the Ontario Government provided financial assistance to municipalities for water works projects. At the same time projects were encouraged that involved, where possible, the supply of treated water from central works to several municipalities in the area.

The largest of these was the South Peel water supply system covering five municipalities serving 200,000 people with 218,000 cubic metres per day (48 million Imperial gallons per day).

In 1972 there were 455 public water supply systems operating in Ontario, 70 of which were operated by the province.

In 1972 the mandate of the OWRC was transferred to the newly formed Ontario Ministry of the Environment, and reconstruction, expansion and improvement of the province's water supply systems continued unabated.

The ministry's annual expenditure for water supply projects grew from \$26 million in 1972/73 to \$50 million in 1978/79. Since that year, however, the ministry's total annual expenditures for waterworks show a marked

decline to \$16.6 million in 1981/82, principally because by that time water systems were well established in all major municipalities and new construction and improvements were extended to smaller communities.

From 1956 to the end of the fiscal year 1982/83, a total of \$2.043 billion was spent by federal, provincial and municipal agencies, according to Statistics Canada figures, to provide 98 per cent of Ontario's urban population with an abundant supply of clean water.

And the quest for a reliable, safe and abundant supply of drinking water for everybody in Ontario goes on.

The increased ability of analysts to detect minute quantities of pollutants in water goes hand in hand with Environment Ontario's continuous revisions and updating of water quality standards. The most recent edition of Ontario's drinking water objectives issued in the fall of 1983 lists over 50 water quality parameters of concern — among them exotic and suspected

Average consumption: 450 lpd

When Environment Ontario engineers get involved in the design of a water treatment plant, they calculate the capacity of the plant on the basis of an average consumption of 450 litres (100 gallons) per inhabitant of the community per day. This basic figure includes the average Ontarian's daily need for drinking, bathing, flushing, laundry, car washing, garden watering etc. At most, 10 litres of this are used for drinking.

The 100 gallon per day per in-

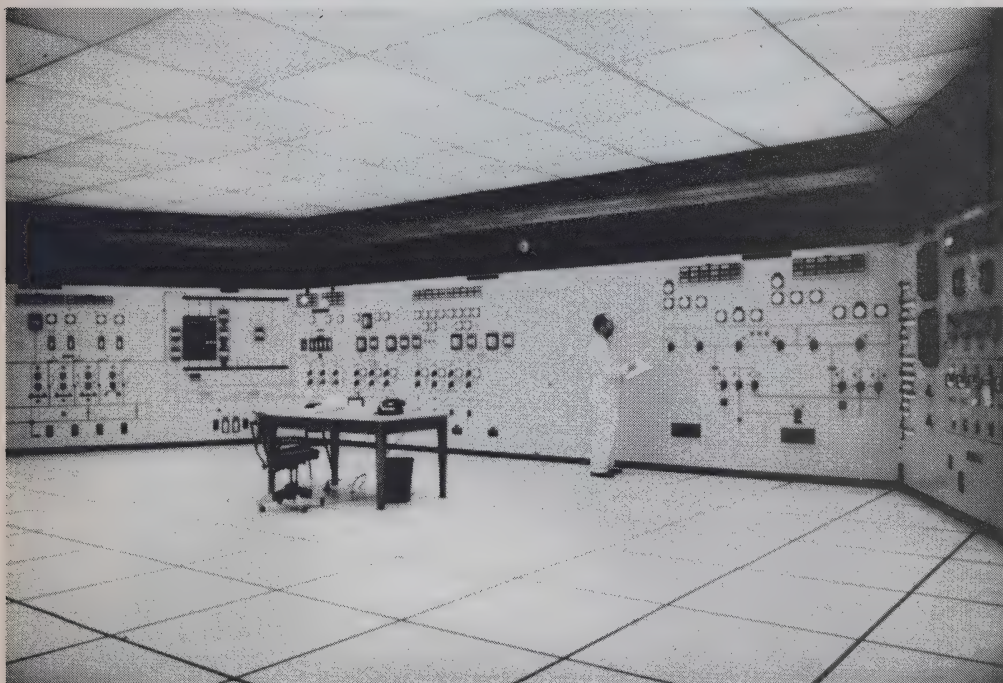
habitant figure is generally modified by a variety of factors, among them the total population of the community, the presence of industry and the need for fire protection. In many of the world's developing countries, the availability of 450 litres of clean, treated water per person per day is an unattainable dream. This amount would be sufficient to keep an individual, for example, in the Sahel desert in Africa alive, healthy and active for more than half a year.

organics and inorganics and radiological, microbiological, physical and process parameters that may have an impact on health or esthetic considerations.

In addition to the Ontario Drinking Water Objectives, the ministry has developed an interim "priority list"

of hazardous contaminants in drinking water and is employing this list in monitoring programs at priority locations.

In the summer of 1983 a dioxin/furan Drinking Water Assessment Program was established, in which 15 water works in the Central and West



The control room of one of Toronto's water treatment plants in 1983.

(photo: Metro Toronto Department of Works)



(photo: Tessa Buchan)

Water quality is constantly monitored at all Ontario water works or at Environment Ontario's laboratories. Orlynn Rein is testing water samples for their oxygen level at the ministry's main laboratory.

Central regions were assessed. Minute traces of low-toxicity dioxins were detected in raw water at the Lakeview and St. Catharines plant intakes, but none have been detected in treated water.

Eventually drinking water quality in major Ontario water works will be assessed in terms of the objectives and the "priority list" in a recently started long-term comprehensive monitoring program.

The ministry is also developing techniques that would allow the re-

moval of hazardous contaminants during water treatment, whenever such removal is required. In a \$1-

international cooperation sought

million project, the use of granular activated carbon in water filtration is being evaluated at the Niagara Falls water treatment plant.

The ministry is also discussing with the federal Department of Health and

Welfare the possible enactment of a National Safe Drinking Water Act, a legislation that may have far reaching implications for the Ontario Drinking Water Program.

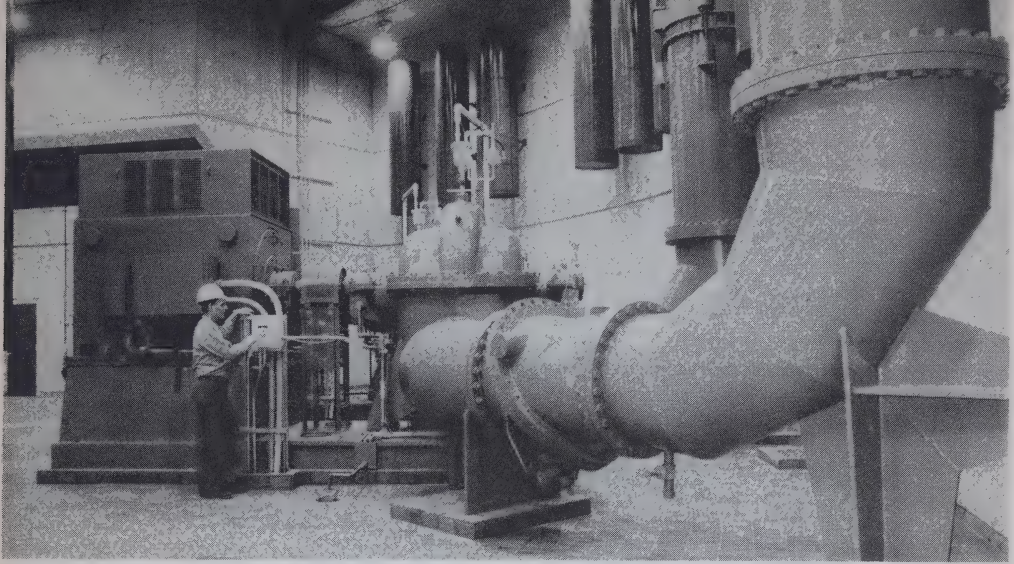
On the international field, Environment Ontario is proposing an international study designed to evaluate Great Lakes water quality as a source of drinking water. Such a study would assemble information on jurisdiction, treatment and monitoring requirements, collect U.S. and Canadian data on levels of contaminants, evaluate the validity of the data, examine the impact of water treatment technologies, compare data with existing and proposed drinking water standards and evaluate human health implications.

Toronto analyzes 1000 samples

Aside from a ministry monitoring program involving all water supply systems, major water works are continuously monitoring the quality of their water output. The Toronto water works, for example, analyzes nearly 1,000 samples daily at its various plants and stations.

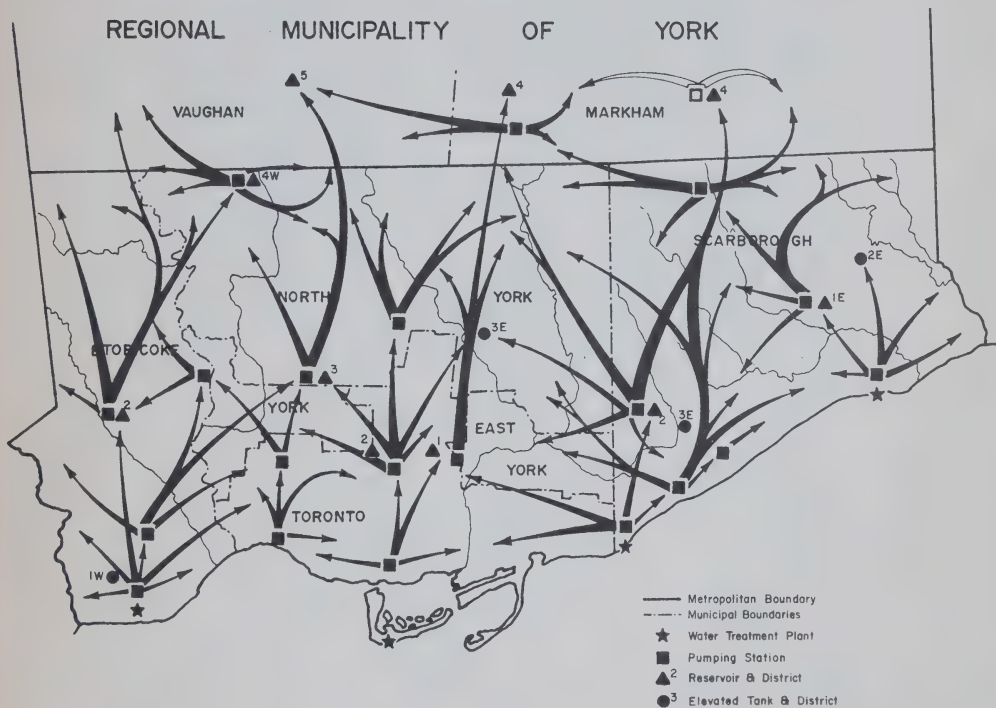
The best indication of the high quality of Ontario's drinking water remains the health of the population. All epidemiological and health statistics indicate that during the past decades overall health in the province has improved markedly, that epidemics caused by waterborne disease carriers are practically unknown, that stomach cancers — the cancer most likely to be caused by pollutants in water — have dramatically decreased while life expectancy shows a continuous upward trend.

Environment Ontario's continuous concern, its close co-operation with other provincial, federal and international agencies and organizations involved in drinking water research, are the best guarantee that drinking water in Ontario will keep its exceptional quality. ◇



One of the large volume pipes that carry water from treatment plants.

(photo: Metro Toronto Department of Works)



METROPOLITAN TORONTO DIAGRAMMATIC WATER DISTRIBUTION PATTERN

In search of unknown contaminants

by Robert Koci

One bright morning a few years ago, Brampton residents found the aluminum siding of their houses defaced with ugly spots. Most of the affected houses lay under the flight-path of aircraft approaching one of the runways of Pearson International Airport. Somebody must have been dropping something off aircraft, defacing houses, polluting the atmosphere...

The task to determine the unknown polluting agent and its source — one of thousands since establishment of Environment Ontario in 1972 — fell

to the inorganic trace contaminants section of the ministry's main laboratory.

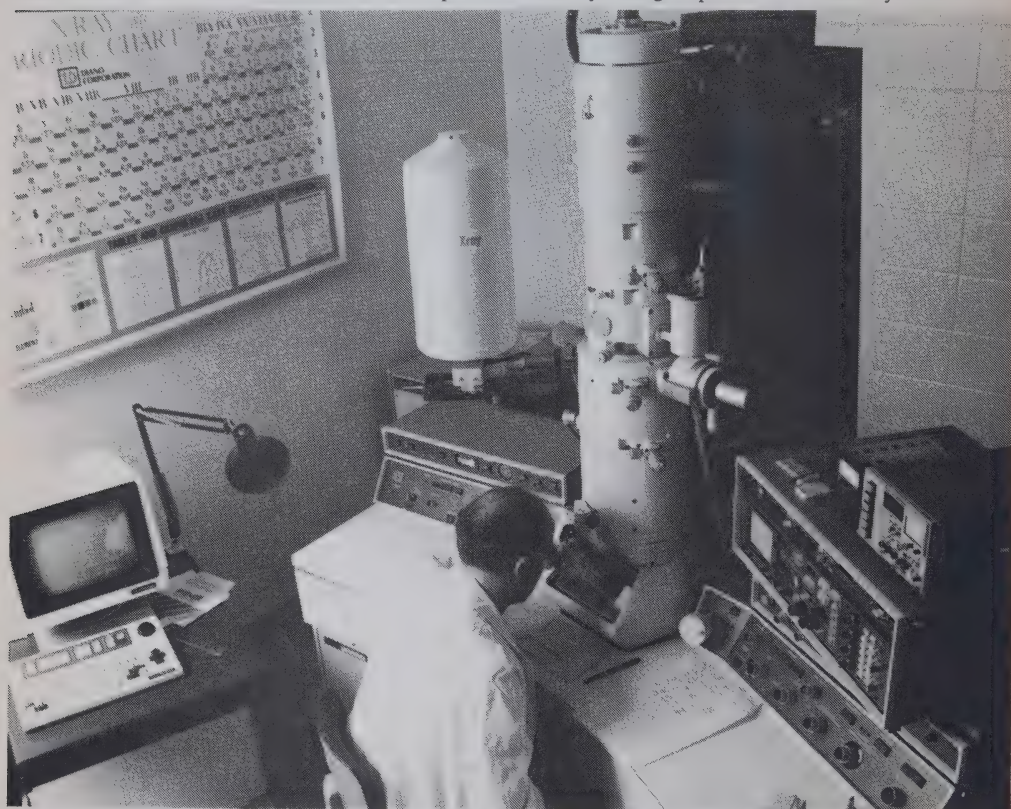
"To determine the presence of a suspected pollutant in a sample is relatively easy," said George Rees of the inorganic trace contaminants section. "All you have to do is to follow well established procedures and the sophisticated analytical equipment available to us at the ministry's laboratory will soon provide the answer."

"The task becomes much more difficult if the objective is to determine the presence and the source of an unknown pollutant that may damage

health or property," said George Rees.

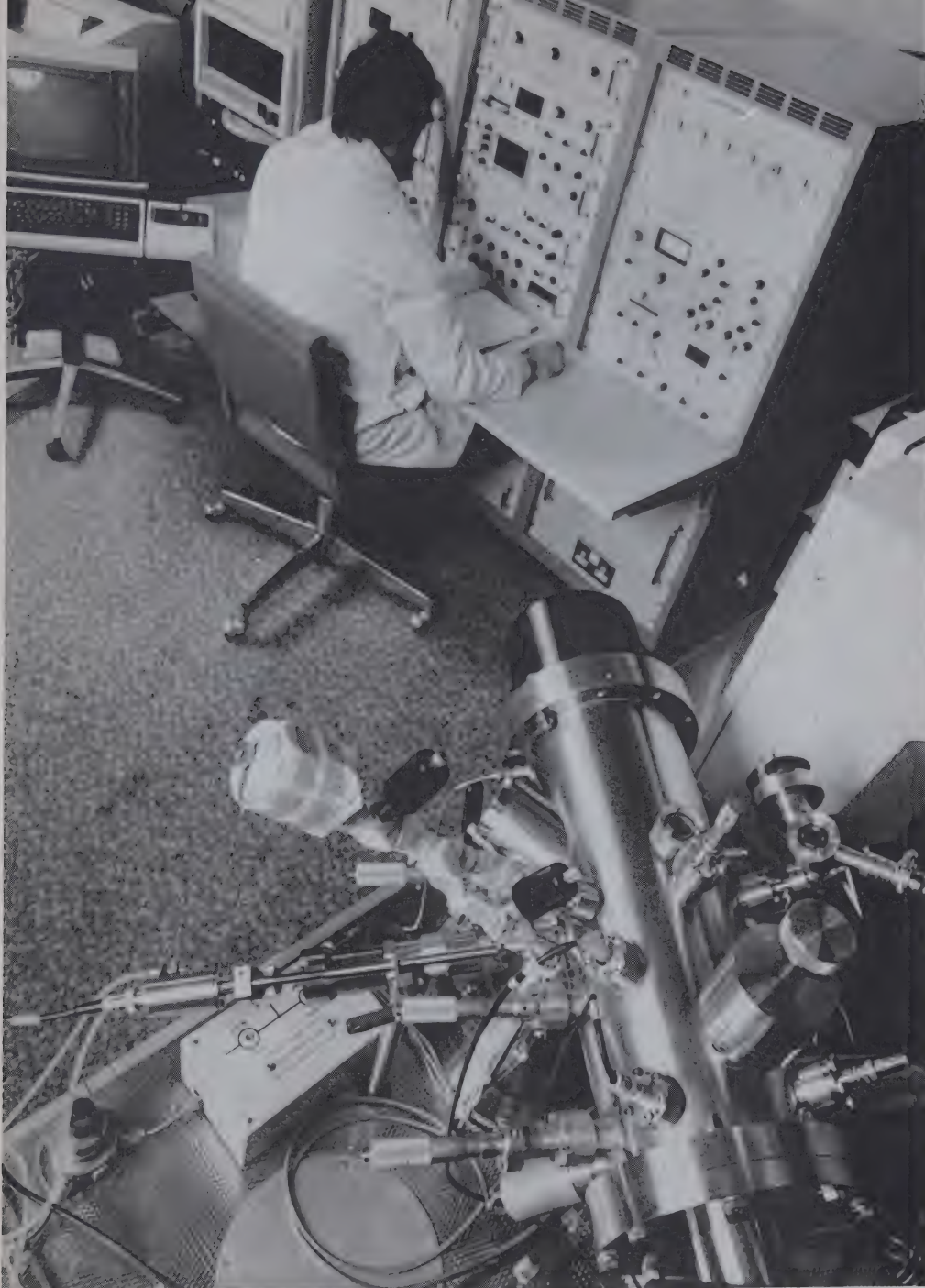
Such detective work is a continuous challenge faced by analysts of the inorganic and organic trace contaminants sections of the ministry's laboratory services and applied research branch.

"Today, chemistry knows about five million organic and about 500,000 inorganic chemical compounds, and new ones are discovered, developed and placed on the market daily," said Dr. Otto Meresz, manager of the organic trace contaminants section. "Many of the organic compounds occur naturally — the human



John Wainwright, microscopist technician at Environment Ontario's main laboratory at the scanning transmission electron microscope.

(photo: Tessa Buchan)



A mass spectrometer used at the ministry's main laboratory. In the foreground stands the part of the

instrument into which samples are introduced for analysis.

(photo: Tessa Buchan)

body consists of thousands of them. Even gasoline is a mixture of about 180 organic chemicals.

"Other chemicals are man-made. Many of these chemicals are necessary for life in all its forms, many others are harmless. Some have unpleasant side effects — like bad odor, bad taste, discoloration. Only a relatively small percentage of the large number of chemicals can be harmful if improperly used. Many chemicals may have some effects on each other."

The same potential for interaction exists with the half-million known inorganic chemicals.

The total possibilities are infinite, or nearly so, but the ministry's main lab is well equipped to handle non-routine environmental challenges. "It takes a lot of experience, and a very close co-operation between analyst and field investigators," said George Rees of the inorganic trace contaminants section.

daily sampling is not simple

"The location of the place where the damage has occurred, the prevailing weather pattern, the proximity of industry, all have to be considered right from the beginning."

An analyst can only work with samples taken by somebody who knows what he is doing.

"A sample brought in by the complainant is rarely of any use," said Mr. Rees. "We don't know under what conditions the material was collected and transported, and the contamination the sample was exposed to on its way to the lab."

When a properly collected sample arrives at the lab, the analyst's experience will help him decide in which direction to look. "The odor of the sample, its appearance and consistency, its crystalline structure and mass will give the first clues," said Dr. Meresz.

"There was, for example, a case of

intermittently bad smelling and bad tasting tap water," Dr. Meresz said. "It came from one of Toronto's large reservoirs, and routine analyses for all general water quality parameters failed to indicate that there was anything wrong with the water. What else should we test for? Could it be toxic? We took some large volume samples and placed fingerlings of a sensitive species of fish into the water. They all survived happily."

fast reaction needed

The unpleasant taste of some samples suggested contamination by chlorinated phenols, although tests for phenolics were negative. Chemical analysis of the water revealed the presence of some chlorophenols at levels well below safe margins, but the source of the chemical remained a mystery.

Then somebody had the idea of checking the reservoir for recent repairs. On close inspection a spot was found that had been patched with a phenol-containing plastic resin material. The water, swirling in the reservoir, occasionally picked up a batch of these phenols. The patch was removed and replaced by one made of an inert material, and the problem was solved.

In this case, the search for the cause took several weeks. In others, the trace contaminant lab can react much faster. When a tractor-trailer jackknifed and spilled white powder on a highway near North Bay, police sent a sample of the material by aircraft to Toronto. Within half an hour Dr. Meresz and his colleagues determined that it consisted of harmless polyvinyl chloride, the raw material for many plastic products.

To find the villain in the case of the spotted aluminum siding in Brampton took longer.

"All the affected homes were built at approximately the same time, about 14 years ago," Mr. Rees said. "Dur-

ing the years, the solvent of the paint on the siding deteriorated and emitted a bloom of fine powder onto the surface.

"The change was so gradual that the owner could not detect the slightly altered color. Raindrops then washed off some of this powder, and the somewhat darker original paint became apparent as darker blotches. To remove the blotches, all that had to be done was to wash the siding with a

normal household detergent. This also restored the original appearance of the paint."

In another instance, laundry drying in the backyard in an area surrounded by three oil refineries was spoiled by dark spots. Again, low-flying aircraft were blamed at first. Analysis, however, found traces of a rare metal in the spots, a metal that occurred only in crude oil from certain oil fields.

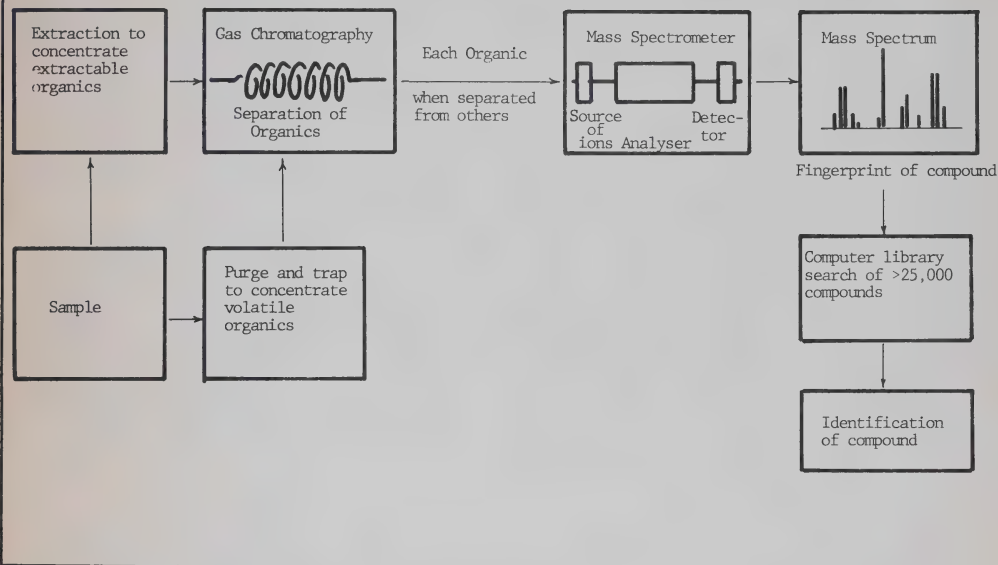
"Only one of the three refineries processed such crude oil," Mr. Rees said. "The culprit was soon identified, the emissions from a leaky pipe were stopped and the complainant was compensated for damage."

illegal dumping likely source

Landfills, as carefully as they may be managed, are often the first suspects. In many cases they are found to be innocent. Emissions from more distant industrial operations, materials dumped illegally outside the landfill, or a natural fungus that feeds on paint have proven to be more likely sources.

To deal with the frequent fungus problem, Mr. Rees has developed some simple, on-site tests: The fungus will turn green, orange or brown if it is wiped with a cloth dipped in Javex. If

PRINCIPLES OF GC/MS ANALYSIS OF KNOWN AND UNKNOWN ORGANICS



this does not happen, a closer analysis is indicated.

For a more thorough analysis, the ministry's laboratory uses some of the most sophisticated equipment available anywhere in North America. In the first steps, several high resolution optical microscopes are used. If they can not give the answer, three types of electron microscopes are available that provide enlargement of up to 1 million times.

For further analysis of complex materials, the laboratories use such analytical X-ray equipment as:

- energy and wavelength dispersive elemental analyzers,
- diffraction compound analyzers,
- emission spectrographs.

This equipment is supported by a battery of atomic absorption spec-

trometers, Technicon auto analyzers and carbon determination equipment. In addition, computers and computer printouts and photographs taken with cameras incorporated into the analytical equipment provide evidence that can be used in court.

court cases are rare

But the work done at the trace contaminant analytical laboratories is generally so conclusive that court appearances are rare. Both laboratories boast of an over 90 per cent success rate, and in most cases the polluter, confronted with the evidence, will negotiate out-of-court settlements.

Samples of unknown material ar-

rive at the trace contaminants laboratories daily. One of the benches in Dr. Meresz' lab is crowded with jars containing a wide variety of samples — white, waxy material, dark oily sludge a sewage treatment plant operator skimmed off the surface of one of his plant's lagoons, a whole slew of powders, liquids and solids somebody found in an abandoned garage, and samples of the contents of some unmarked drums a farmer found in his field.

"We face a new problem every day, often several of them during a single day," Dr. Meresz said. "Some analyses have to be done in a hurry, some simply take time. But that is what makes this work so interesting. And the knowledge that we really succeed, most of the time, in finding the real cause of the complaint." ◇



Dr. Sam Linzon of Environment Ontario's air resources branch poses in front of one of the fierce tigers that protect the Imperial Palace in Beijing.

China is paying the price of progress in acid rain, sulphur-burned trees and rust-red rivers, said Samuel Linzon, supervisor of the phytotoxicology section of Environment Ontario's air resources branch.

Dr. Linzon spent two weeks as a guest of the People's Republic of China to discuss air pollution control with the country's experts.

Dr. Linzon joined 29 other air quality specialists, 27 from the U.S. and two Canadians, to see five major industrial cities: Beijing (Peking), Anshan, Shenyang, Shanghai and Hangzhou.

Dr. Linzon found himself in a country in which 80 per cent of the population lives and works on farms

Ontario's expertise to help clean the air in China

using every square centimeter of soil. In the large industrial cities rush-hour traffic jams consist of masses of bicycle riders. Travel on the railway and life in hotels is reminiscent of the conditions travelers found in the early part of this century in Canada.

As an expert on air pollution and its effects on plants, Dr. Linzon found the environmental situation in China quite different from conditions in Ontario. "China is about 20 years behind Canada and the U.S.," he said.

poplar trees on the property," Dr. Linzon said.

Following the tour, the Chinese hosts asked a number of questions on the operation of Stelco's plant in Hamilton, especially questions dealing with the control of dust from the furnaces and the control and disposal of such dust.

In Beijing, Dr. Jenny Liu, director of the Institute of Environmental Chemistry, expressed an interest in acid rain. She said that acid rain is a

SO₂ injuries were evident

"A few plants have air pollution control installations, but most are uncontrolled. The main problem is the combustion of coal with a high sulphur content, both in industrial factories and in homes."

This was especially evident in Anshan. The Anshan Iron and Steel Company is comparable in production capacity and plant lay-out to the Stelco plant in Hamilton. While the Hamilton plant employs about 12,000, the Anshan plant has 140,000 workers on its payroll.

The runoff of the plant's flotation process, by which ore is concentrated to a 60 per cent iron content, turns a river red with iron oxide.

The ten blast furnaces at Anshan are equipped with little pollution control equipment. Of nine open hearth furnaces, only one was controlled by an electrostatic precipitator. The Chinese explained that controls would be added to the other eight furnaces at the rate of one precipitator per year.

"While walking around the steel mill, sulphur dioxide (SO₂) injury and dust coatings were very evident on all

special problem in Southern China, where rain has been measured at pH levels between 4 and 5. However, she said there are few lakes in China that are acidic.

In Shenyang, the Chinese asked the delegation for suggestions on how to control the many pollution problems in the city's combined zinc and copper smelter and lead refinery, built in 1936. Although some pollution control equipment was provided at the plant, arsenic was escaping in the dust from all processes. "Here too, severe SO₂ damage was evident on poplar trees," Dr. Linzon said.

At the outskirts of the city, Dr. Linzon visited a people's commune inhabited by 2,500 families with a total of 10,500 people on an area of 31 square kilometres. There are ten co-operatives, three fisheries, two animal husbandry areas and 22,000 rice-paddy fields. Rice is the main product, but there are also 48 factories making products which range from steel windows to ice cream. Eighty per cent of the families have TV sets, ten per cent have motorcycles.



A smelter in Shenyang is in some ways similar to Stelco's operation in Hamilton — but is equipped with very little emission control.

During their stay in Shenyang, the delegation was visited by representatives from oil refineries in nearby Fushun eager for information on the control of pollution from their plants. Their questions centered mainly on the control of volatile losses in storage tanks during transport, on the American formulae for storage vessel emissions, on methods for the measuring of stack emissions and on the effects of atmospheric chemical reactions of various pollutants.

After two nights of travel by railway, the delegation arrived in Shan-

ghai to meet the Shanghai Bureau of Metallurgical Industry. The deputy director of the bureau said that the metallurgical industries were the

metallurgy worst polluter

cause of the worst pollution in China, and that 66 per cent of smoke emissions and 41 per cent of fume emissions had been controlled. Acid rain was an important and current concern in Shanghai.

Dr. Linzon described Ontario's air pollution program. Because of ministry controls and the co-operation of industries, he said, air quality in Ontario has improved dramatically during the past 15 years. Between 1971 and 1979 SO₂ emissions were reduced by 68 per cent, lead emissions by 45 per cent, carbon monoxide by 57 per cent, total suspended particulate by 32 per cent and ozone and nitrogen oxides by 20 per cent.

In a later session, Dr. Linzon discussed the effects of SO₂ on crops and trees. He differentiated between



Statues of the Canadian most famous in China, Dr. Norman Bethune, chronic and acute injury, listed the plants that are most susceptible and showed slides of the work done in Dorset and at the phytotoxicological laboratory in Brampton.

A. Chmelauskas of MacMillan Bloedel, Vancouver, gave a detailed account on how pulp and paper mills are controlled in Canada.

During the train-ride to Hangzhou, the last city visited, members of the delegation could see farm work on rice fields. Dr. Linzon noted that all work was done by hand. "Although farm mechanization is talked about in books and numbers of tractors, com-

biners and threshers are stated, at no time did the delegation see any farm mechanization. At one place, rice was threshed by hand by the roadside. Certainly some farms are mechanized, but they were not seen on the trip."

Travelling from Northern China to the south, various crops were observed by the delegation, from corn, wheat and sorghum to cotton and tea plantations.

At Hangzhou, the delegation discussed control of emissions from an aluminum smelter located about 400 km from the city. The smelter is sur-

rounded by a tea plantation, but plant management was not aware of the possibility of fluoride damage to the crop. Dr. Linzon explained the risks of forage contamination by fluorides which could cause diseases in grazing animals.

Following the discussion, the delegation visited a tea plantation and a silk factory. Dr. Linzon found that in the silk factory the noise level was very high and probably above Ontario's occupational health standards.

The China trip concluded with a visit to Hong Kong, where the delegation was informed of the environmental program in the colony. The pollution control authority of Hong Kong has a staff of 119. Five ordinances cover air, water, waste, noise and environmental impact assessment. The agency sets emission standards, regulations and policy, while the Secretary for Health and Welfare approves and passes acts and regulations. The Labor Department enforces the acts.

The major sources of pollution in Hong Kong are four power plants using oil with a 3 to 5 per cent sulphur content and three incinerators handling each about 1,200 tons of waste per day. Minor sources include 46,000 industries, 5,000 restaurants and 330,000 vehicles, half of which are driven by diesel engines. The total SO₂ emissions were about 230,000 tons in 1981, 180,000 tons of CO, 50,000 tons of NO_x, 20,000 tons of hydrocarbons and 22,000 tons of particulates.

In China and in Hong Kong the delegation was welcomed everywhere, especially in the People's Republic where people appeared interested in information on how to assess and control their air pollution problems.

"I believe the invitation to visit China has opened the door for Ontario. By making representations to Chinese scientists, planners and industrialists on Ontario's capabilities in dealing with air pollution problems, I am hopeful that future marketing opportunities will develop for the province," Dr. Linzon said. ◇

MOE co-sponsors Pitch-In 1984

Environment Ontario co-sponsored and contributed \$75,000 to Pitch-In 1984, the annual event staged since 1980 by the Ontario Federation of Anglers and Hunters to help clean the environment of litter.

Pitch-In, from May 7 to 13, also formed a part of the province's bicentennial celebration.

"We are pleased to have participated in an event which focuses upon concern for the environment and which stimulates and encourages thousands to work together on environmental projects intended to keep our province clean and safe," Environment Minister Andy Brandt said. Since 1980, Environment Ontario has contributed \$275,000 to support Pitch-In.

"We are going to continue to support Pitch-In," said Mr. Brandt. "However, the event also merits the support of business which has a stake in the environment equal to that of the public and of government. It is my hope that sponsorship will be found from the private sector in 1985."

Pitch-In started as a co-operative effort of the Federation of Anglers and Hunters and other environmentally-concerned organizations. With the financial support of Environment Ontario, more than 50,000 children, teenagers and adult participants picked up about 200 tons of garbage scattered all over the Ontario landscape.

In 1982 the effort was extended to a full week, and 1,276 Ontario schools, groups and organizations participated with enthusiasm. Learning from previous experience, the 1982 Pitch-In was held in May, at a time when vegetation was not yet dense enough to hide litter and before hordes of mosquitoes hampered the volunteers. About 100,000 garbage bags were



Ontario Environment Minister Andy Brandt and Doug Corbridge of the Ontario Federation of Anglers and Hunters, at the kick-off of Pitch-In '84.
(photo: Barry Shainbaum)

filled with discards ranging from beverage cans to parts of washing machines.

In 1983, participation grew further to involve about 200,000 volunteers from 1,772 schools, Scout and Guide troops, Federation of Anglers and Hunters associations, town and village administrations, chambers of commerce and many other organizations. About 50 municipalities took advantage of the occasion to conduct local information and educational campaigns for cleanliness in nature.

As part of Ontario's bicentennial

celebrations, in 1984 Pitch-In formed a part of Environment Ontario's program of special events scheduled for the occasion.

These events include:

- special speakers and events as part of the 31st Annual Ontario Industrial Waste Conference.

- development of a comprehensive educational information kit to be made available to schools.

- special workshops and seminars as part of the summer educational program, Environmental Explorations.

It's all one world...

Have environmental laws failed?

The environmental laws established in the United States since 1970 have not achieved what they were designed to do, principally because they were based on invalid assumptions, U.S. EPA administrator William Ruckelshaus told students of the University of North Carolina.

The original assumptions were:

- that all pollutants are known.
- that the adverse health and environmental effects of the pollutants were also known.

- that we knew how to measure pollutants.

- that we knew how to regulate pollutants to acceptable levels at reasonable cost.

Now, in 1984, it is clear that none of our earlier assumptions were right, at least not completely, said Mr. Ruckelshaus.

We now know that:

- we recognize some pollutants but certainly not all of them.

- our knowledge of the pollutants' health and environmental effects is very sketchy.

- we have trouble establishing a safe level for these pollutants.

- the advanced measurement techniques we have developed since have revealed a whole new set of problems.

We can, for example, detect dioxin in parts per quadrillion, but we don't know what to do about it.

Another assumption was that environmental laws could be changed once more knowledge was gained, Mr. Ruckelshaus said. But emotions now run so high among polarized factions that it is difficult to change existing laws even in the light of scientific developments and the enorm-

ous administrative difficulties of their enforcement.

The assumptions that led to the establishment of the U.S. Safe Drinking Water Act are also severely criticized by Environmental Science and Technology magazine. At the time of its passage, the U.S. Congress assumed that there were 20,000 community water treatment systems in the U.S. Today, the EPA estimates that there are almost 60,000 such systems and that 90 per cent of these serve communities of less than 10,000 people.

The authors of the water act based the standards incorporated in the law on the capabilities of large and regional systems and on the assumptions that suitable technologies were generally available.

Statistics for non-compliance show that the majority of failures occur in small systems, especially with regard to high concentrations of fluoride, arsenic, selenium and barium in groundwater systems and, in many cases, in coliform and turbidity violations. The EPA estimates that in 1980, 50 outbreaks with 20,000 cases of water-borne diseases were caused mostly by failure of small water treatment systems.

Black Forest affected

One half of the trees in Germany's Black Forest are affected by acid rain, reports Friedemann Kaelble, director of the forest service in Karlsruhe, West Germany. "The trend is alarming," he said, "and unless it changes during the next five years, some of our woods will be completely gone."

The reason for non-compliance is that small communities generally cannot afford the costs of treatment available to large systems. The magazine appeals to private industry to develop package water treatment systems, the costs of which could be aggregated over large service areas on a contract basis. In addition, the use of point-of-use treatment devices should also be considered.

France joins acid rain battle

The European nations set to combat acid rain have been joined by the French government which announced that it wants to reduce acid rain-causing emissions by 50 per cent by 1990. The cost of the program is estimated at about \$4 billion.

Antarctic dumping ground

An inquiry under way by the Australian senate has been told, that "small but significant environmental disasters are happening at some of the Australian research stations on the Antarctic continent". Snow petrels no longer nest, moss beds have been trampled, and the environments of the stations have been transformed into ugly construction camps.

Critics of the Australian Antarctic efforts also contend that the sensitive environment will soon face further threats from the construction of fish processing factories, tourist centres, land bases for offshore exploration, oil drilling and mineral extraction.

Forest damage by air pollution

Forest growth in North America and in parts of Europe shows a marked decline since about 1950, according to scientists attending a symposium on air pollution and forest productivity in Washington, D.C.

Generally, acid rain was named the probable cause of the decline, although other possible causes were named such as ozone, trace metals and combinations of acid rain, ozone and metals. Most researchers believe that disease and insects are not the primary damaging agents.

Arthur Johnson of the University of Pennsylvania found that 40 per cent of red spruce and pitch pine tree ring cores collected in the northeast U.S. showed an abrupt shift to abnormally narrow rings in the early to mid-sixties without subsequent recovery.

Charles F. Baes III of the Oak Ridge National Laboratory found steadily increasing concentrations of aluminum, cadmium, copper, iron, manganese, molybdenum, titanium and zirconium in short-leaf pines growing in east Tennessee. The rings of the affected trees also showed decreasing growth during the same period.

In the Smoky Mountains National Park the concentration of iron in three rings was elevated and growth was slow from 1863 to 1912. During this time iron and copper ores containing sulphides were smelted about 88 km upwind. The smelter reduced its sulphur dioxide (SO₂) emissions under a Supreme Court order in about 1910.

After reduction of the emissions, iron content in the trees decreased until 1950 when it started to rise again. The research suggests that SO₂ emissions could affect metal uptake and growth in trees.

An industrial plant that started operation in the early 1940s and emitted sulphur was suspected of causing tree damage near Front Royal, Va., by

R.L. Phipps of the U.S. Geological Survey. Pines in the area showed a substantial growth from 1910 to 1950 and an equally pronounced decline in the following years, said Mr. Phipps.

Several researchers described ozone injury to forests in the western and eastern U.S. They suspect that high ozone levels of 0.12 parts per million for 1 hour found at higher altitudes caused reduced needle growth

and foliar symptoms typical of ozone damage on eastern white pines in the Shenandoah National Park in Virginia.

Several speakers suspected that the cause of forest decline may be more than one pollutant, as acid rain, gaseous pollutants and trace element loadings have increased over the same approximate time span and in the same regions as has industrialization.

Holland registers 4000 dumps

The discovery of 1,650 drums of toxic wastes under a housing development in 1979 and of 10,000 more drums of toxic wastes, including dioxins, in a garbage dump, prompted Leendeer Ginjaar, Holland's environment minister, to start a search for more such dump sites. He asked Holland's provincial administrations to survey and inventory every suspected site.

Within six months, the inventory of illegal dumps registered more than 4,000 such sites, 350 of which were so seriously contaminated that they posed immediate threats to health and

to the environment.

The cost of restoring these 350 dumps is estimated at about \$1 billion, about double the amount Mr. Ginjaar was prepared to provide in a national "Superfund" to pay for the clean-up.

The province of Utrecht environmental protection agency found during the search a dump containing toluene and xylene under its five-year-old office building and promptly relocated to other premises. In Papendrecht, police discovered 14 barges full of contaminated fuel oil. Some of the barges were subtly modified to allow for dumping at sea.

CSR finds high SO₂ levels

Czechoslovakia's environment had one of the highest levels of sulphur dioxide and air pollution continues to rise because of the extensive use of low-quality brown coal, reports the Czechoslovak Academy of Sciences. The report alarmed the government to such a degree that it was not made public. Copies were, however, smuggled out of the country by members of the Charter of 77, a human rights organization.

The report found that by the end of the century, 40 to 60 per cent of the

country's forests would be degraded. Water is being contaminated and 60 per cent of all livestock is being killed by poisoning by heavy metals like lead and mercury.

Some heavily contaminated forests are being sprayed with calcium to reduce acidity. The country, however, does not have a budget for environmental protection and only "regional committees" are responsible for seeking remedies. Scarce resources are being channeled to export instead of to environmental protection.

Special wastes go to sea

The manufacture of the countless materials and products needed by our civilization also produces waste. Most of this waste is harmless; only a small percentage can be dangerous to the environment or to people.

In most European and North American countries the disposal of toxic waste is running into difficulties. To avoid the main obstacle to toxic waste removal, the "not in my backyard" syndrome, several European nations have resorted to the incineration of potentially dangerous waste at sea in specially-built incinerator ships.

Burning at sea is regulated by an agreement signed in Oslo in 1980 by a number of European industrialized countries. This Oslo convention bans incineration at sea if there are "practical alternative land-based methods." It also requires signatories to justify sea burning, but up to now none of the parties involved have provided such a justification.

In 1980, European countries burned almost 200,000 tonnes of waste at sea. Now, the United States prepares to join the sea incinerators. The director of the U.S. Environmental Protection Agency, William Ruckelshaus, says his staff will continue to work actively with companies involved in at-sea-incineration. This incineration would probably take place in the Gulf of Mexico.

Up to now, most waste burning takes place in the North Sea. Generally toxic organochlorine compounds, such as DDT and PCB, are burned. The European market is served by two incinerator ships, the *Vesta* and the *Vulcanus I*.

Incineration of wastes at sea has other advantages for its proponents aside from the avoidance of the NIMBY syndrome: it is cheap and beyond the control of environmental laws. European experts estimate that

about half of the burning is not licensed or done without regard to the Oslo conventions.

Incineration of waste at sea is less than half as expensive as incineration on land, if land-based facilities can be found at all. The average cost of sea incineration is given as \$85 per tonne compared with \$196 per tonne for incineration on land.

The vessels engaged in the business do not require all the safeguards required for land-based incineration. The incinerators run cheaply because they do not retain the burned material, and they generally do not attain the high temperatures required for a safe incineration.

European experts estimate that 100,000 tonnes of organochlorides burned at sea release about 100 tonnes of toxic solids and 30,000 tonnes of hydrochloric acid into the air and into the ocean. Efficient land-based plants would emit about one tenth of a tonne

of organochlorides and no hydrochloric acid.

A Chicago company, Chem-Waste, is building the *Vulcanus II* and another company, At-Sea-Incineration, has received a \$56-million U.S. government loan to build another sea-going incinerator. Two other companies are preparing to offer incineration services to industry and to the U.S. Department of Defense.

Chem-Waste burned waste at sea in 1981 and 1982 under a "research burn" permit granted by the EPA. The 1982 burn was cancelled when it was discovered that the company did not adhere to the conditions of the permit.

Despite this cancellation, the company received another three-year permit pending the outcome of public hearings. The hearings have been held, and the safety of incineration at sea was discussed. The ultimate decision is now in the hands of the EPA.

Russia finds acid rain, too

Monitoring stations along Russia's western border are detecting acid rain entering the Soviet Union, reports A.G. Ryaboshapko, a meteorologist with the Institute of Applied Geophysics in Moscow. The Soviet scientist found that lakes in northwest Russia, especially in Karelia and on the Kola Peninsula, were susceptible to an increased acidity of precipitation. The addition of acid rain to the naturally acid soil threatened to lower the nutrient properties of these soils and to reduce agricultural crops.

The acid rain affects an area of about 350,000 square miles adjoining the western border of the Soviet Union. At the sampling stations, established since 1981 from the Finnish to the Czechoslovak border, precipitation with pH from less than four to

seven were registered .52 per cent of the samples had a pH lower than 4.5. Such rainfalls were associated with weather patterns moving in from central and western Europe.

New water protection act

Florida's new Water Quality Assurance Act of 1983 establishes a \$3 million trust fund for expenses incurred through the act. A tax of 2 cents per barrel on pollutants will help to build the fund up to \$12 million. The act also prohibits hazardous waste landfills, requires establishment of a hazardous waste treatment facility and sets up a network of water quality monitoring facilities.



Ministry
of the
Environment

Hon. Andrew S. Brandt,
Minister

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